

A Guide to TracVision C3 owner's manual

- Installation Instructions
- User's Guide
- Technical Manual



KVH TracVision® C3

TracVision C3 Owner's Manual Addendum



(**ECO #s 6138, 6356, 6580, 6643, 7132, 7564**)

The following information applies to Revision G of the TracVision C3 Owner's Manual (KVH Part Number 54-0159).

1.3 Materials Provided with TracVision C3

The data/power cable supplied with the system is 28 ft (8.5 m) in length. The RF cable supplied with the system is 50 ft (15 m) in length. Table 1-3 has been updated to show the correct cable lengths.

Component	KVH Part No.
Antenna Unit (comprising):	01-0225-20 [†] 01-0225-23 ^{††} 01-0225-26 ^{†††} 01-0225-29 ^{††††}
Baseplate Assembly	02-1245-01 [*] 02-1245-03 ^{**}
Radome Assembly	02-0953-04
RF Cable (50 ft/15 m)	32-0417-50
Data/Power Cable (28 ft/8.5 m)	32-0730-28
PC Cable (6 ft/1.8 m)	32-0628-06
Mounting Plate	20-0684
Kitpack***	72-0102
Owner's Manual	54-0159
IRD Ground Wire	32-0583-50
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

Table 1-3
TracVision C3 Packing List



Cables for the TracVision C3 are stored beneath the antenna unit during shipping.

[†]European TracVision C3 system

^{††}North American TracVision C3 system (defaulted to DIRECTV)

^{†††}North American TracVision C3 system (defaulted to DISH Network)

^{††††}North American TracVision C3 system (defaulted to ExpressVu)

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

*** A complete listing of kitpack contents is provided in Table 2-2.

5.3 Replaceable Parts

Table 5-1 has been updated to show the new part numbers for the data/power cable, RF cable, RF PCB, and European LNB.

Part Name	Part Number
Baseplate Assembly	02-1245-01* 02-1245-03**
Radome Assembly	02-0953-04
Data/Power Cable	32-0730-28
RF Cable	32-0417-50
PC Cable	32-0628-06
CPU PCB	02-1043-02
RF PCB	02-1524
Antenna Gyro	02-1035
Antenna Gyro Gasket	24-0139
System Fuses	16-0017-3150
LNB (European system)	19-0346
LNB (N. American system)	19-0056
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

Table 5-1

Field Replaceable Units

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

TracVision C3 Owner's Manual Addendum

(ECO #7173)

The following information applies to Revision G of the TracVision C3 Owner's Manual (KVH Part Number 54-0159).

Your TracVision C3 system has the capability to automatically switch between the Echo 119 and Echo 110 satellites in DISH 500 mode.

DISH 500 Mode

When a compatible DISH Network™ receiver* is connected to the TracVision antenna's RF1 connector, and the antenna is configured for DISH 500 mode, you can switch between the Echo 119 and Echo 110 satellites using the receiver's remote control.



** All new DISH Network receiver models should be compatible with the TracVision antenna's DISH 500 mode. The following models have been proven compatible by KVH: DishPro 301, 311, and 811.*

Configuring the Antenna for DISH 500 Mode

To configure the TracVision antenna for DISH 500 mode, you will need to run the receiver's Check Switch function twice. You do **not** need a laptop computer.

To configure the TracVision antenna for DISH 500 mode, follow the steps below.

1. Stop your vessel in a blockage-free area and do not move the vessel until you have completed the entire configuration process.
2. Turn on the master receiver (*the receiver that is connected to the antenna's RF1 connector*) and the television.
3. Turn on the TracVision antenna using the switchplate's power switch.
4. Wait one minute for the antenna to initialize.

5. Using the receiver's remote control, go to the "Point Dish/Signal Strength" screen (press *Menu*, **6, 1, 1** (on most models)).
6. Using the remote control's arrow buttons, highlight "Check Switch" and press the *Select* button.
7. Highlight "Test" and press *Select*.
8. Wait a minimum of **15 minutes** for the Check Switch function to complete and for the antenna to restart and configure itself for DISH 500 mode.

If the Check Switch function fails (the receiver locks up), disconnect power from the receiver, restart the antenna, then restore power to the receiver and try the Check Switch function again.

9. Run the Check Switch function a second time. This allows the receiver to configure itself for automatic satellite switching.
10. Wait until the Check Switch function is complete (*it will take a couple minutes*).

11. Ensure that the following is displayed on the TV:

Installed Switch: SW42				
Input:	1	1	2	2
Satellite:	119	119	110	110
Polarity:	Odd	Even	Odd	Even
Status:	Satellite reception verified			

This indicates that the receiver is configured properly. If this information is not displayed **exactly** as shown above, try running the Check Switch function again.

12. Exit the menu and allow the receiver to download the program guide.
13. Once the program guide has loaded, you can start enjoying satellite TV. The antenna will switch between satellites automatically as you change channels using the receiver's remote control.

TracVision C3 Owner's Manual Addendum



(ECO #s 6138, 6356, 6580, 6643, 7132)

The following information applies to Revision G of the TracVision C3 Owner's Manual (KVH Part Number 54-0159).

1.3 Materials Provided with TracVision C3

The data/power cable supplied with the system is 28 ft (8.5 m) in length. The RF cable supplied with the system is 50 ft (15 m) in length. Table 1-3 has been updated to show the correct cable lengths.

Component	KVH Part No.
Antenna Unit (comprising):	01-0225-20 [†] 01-0225-23 ^{††} 01-0225-26 ^{†††} 01-0225-29 ^{††††}
Baseplate Assembly	02-1245-01* 02-1245-03**
Radome Assembly	02-0953-04
RF Cable (50 ft/15 m)	32-0417-50
Data/Power Cable (28 ft/8.5 m)	32-0730-28
PC Cable (6 ft/1.8 m)	32-0628-06
Mounting Plate	20-0684
Kitpack***	72-0102
Owner's Manual	54-0159
IRD Ground Wire	32-0583-50
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

Table 1-3

TracVision C3 Packing List



Cables for the TracVision C3 are stored beneath the antenna unit during shipping.

[†] European TracVision C3 system

^{††} North American TracVision C3 system (defaulted to DIRECTV)

^{†††} North American TracVision C3 system (defaulted to DISH Network)

^{††††} North American TracVision C3 system (defaulted to ExpressVu)

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

*** A complete listing of kitpack contents is provided in Table 2-2.

5.3 Replaceable Parts

Table 5-1 has been updated to show the new part numbers for the data/power cable, RF cable, RF PCB, and European LNB.

Part Name	Part Number
Baseplate Assembly	02-1245-01* 02-1245-03**
Radome Assembly	02-0953-04
Data/Power Cable	32-0730-28
RF Cable	32-0417-50
PC Cable	32-0628-06
CPU PCB	02-1043-02
RF PCB	02-1342
Antenna Gyro	02-1035
Antenna Gyro Gasket	24-0139
System Fuses	16-0017-3150
LNB (European system)	19-0346
LNB (N. American system)	19-0056
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

Table 5-1

Field Replaceable Units

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

TracVision C3 Owner's Manual Addendum



(ECO #6138)

The following information applies to Revision G of the TracVision C3 Owner's Manual (KVH Part Number 54-0159).

Table 5-1 has been updated to show the new part number for the RF PCB.

5.3 Replaceable Parts

Part Name	Part Number
Baseplate Assembly	02-1245-01* 02-1245-03**
Radome Assembly	02-0953-04†
Data/Power Cable	32-0730-45
RF Cable	32-0417-45
PC Cable	32-0628-06
CPU PCB	02-1043-02
RF PCB	02-1237
Antenna Gyro	02-1035
Antenna Gyro Gasket	24-0139
System Fuses	16-0017-3150
LNB (European system)	19-0196
LNB (N. American system)	19-0056
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

Table 5-1
Field Replaceable Units

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

† Specify color when ordering

Congratulations!

You have selected one of the most advanced satellite tracking systems available today. KVH® Industries' TracVision® C3 is designed for use with European and North American DVB-compatible satellite services as well as DIRECTV®. This manual provides detailed instructions on the proper installation, use, and maintenance of your TracVision C3 system.

Throughout this manual, important information is marked for your attention by these icons:



A helpful tip that either directs you to a related area within the manual or offers suggestions on getting the highest quality out of your system.



An alert to important information regarding procedures, product specifications, or product use.



Information about installation, maintenance, troubleshooting, or other mechanical issues.



An electrical safety warning to help identify electrical issues that can be a hazard to either this KVH product or a user.



TracVision C3 Serial Number



This serial number will be required for all troubleshooting or service calls made regarding this product.

Direct questions, comments, or suggestions to:

KVH Industries, Inc.
50 Enterprise Center
Middletown, RI 02842 USA
Tel: +1 401 847-3327
Fax: +1 401 849-0045
E-mail: info@kvh.com
Internet: www.kvh.com

KVH Europe A/S
Ved Klaedebo 12
2970 Hoersholm Denmark
Tel: +45 45 16 01 80
Fax: +45 45 86 70 77
E-mail: info@kvh.dk
Internet: www.kvh.com

If you have any comments regarding this manual, please e-mail them to manuals@kvh.com. Your input is greatly appreciated!

[Click here to go to our state-of-the-art Customer Support web page...the fastest and easiest way to get all of your questions answered!](#)



KVH Part # 54-0159 Rev. G

© 2003, KVH Industries, Inc.

KVH
NASDAQ
LISTED

TracVision®, KVH®, and TracNet™ are trademarks of
KVH Industries, Inc.

DIRECTV® is an official trademark of DIRECTV, Inc.,
a unit of GM Hughes Electronics.

DISH Network™ is an official trademark of
EchoStar Communications Corporation.

ExpressVu is a property of Bell ExpressVu, a wholly owned
subsidiary of Bell Satellite Services.

DirecPC® is a registered trademark of
Hughes Network Systems, a unit of GM Hughes Electronics.

Table of Contents

1	Introduction	1-1
1.1	Digital Satellite Television	1-1
1.2	TracVision C3 System Overview	1-2
1.2.1	TracVision C3 Components	1-3
1.2.2	Integrated Receiver Decoder (IRD)	1-4
1.3	Materials Provided with TracVision C3	1-4
1.3.1	Additional Materials Required for TracVision C3 Use	1-5
2	Installation	2-1
2.1	Choosing the Best Location	2-2
2.2	Mounting the Antenna Unit	2-4
2.3	Connecting System Components	2-9
2.3.1	Connecting the Antenna Data/Power Cable	2-10
2.3.2	Connecting to Vessel Power	2-11
2.3.3	Connecting the IRD Ground Wire	2-12
2.3.4	Installing the Switchplate	2-12
2.3.5	Connecting the Antenna RF Signal Cable to the IRD	2-13
2.3.5.1	Installing Two IRDs and TVs (North American Systems Only)	2-13
2.3.5.2	Connecting Three or More IRDs and TVs (North American Systems Only)	2-14
2.4	Activating the IRD	2-15
2.5	Selecting the Active Satellite	2-16
2.5.1	Installing Your Selected Satellites	2-17
2.5.2	Programming User-defined Satellites	2-19
2.6	Setting the Skew Angle (European Systems Only)	2-24
2.7	Checking Out the System	2-24
2.8	Changing Geographic Location	2-36
3	Using Your TracVision C3	3-1

3.1	Turning on the System	3-1
3.2	Changing Channels and Switching Between Satellites	3-2
3.2.1	Using the IRD Remote Control to Switch Between Satellites	3-2
3.2.2	Using the TV/SAT Switch to Switch Between Satellites	3-3
3.2.3	Using a PC to Switch Between Satellites	3-4
3.3	Watching Television	3-5
3.4	Internet Access	3-6
4	Troubleshooting	4-1
4.1	Causes and Remedies for Common Operational Issues	4-1
4.1.1	Blown Fuse or Improper Wiring	4-2
4.1.2	Vessel Turning During Startup	4-2
4.1.3	Incorrect Satellite Configuration	4-2
4.1.4	Satellite Signal Blocked	4-3
4.1.5	Dew or Rain Pooling on Dome	4-3
4.1.6	Satellite Coverage Issue	4-3
4.1.7	Radar Interference	4-3
4.1.8	Incorrect or Loose RF Connectors	4-4
4.1.9	Type of Multiswitch Used (North American Systems Only)	4-4
4.2	IRD Troubleshooting	4-4
4.3	Antenna Gyro and LNB Faults	4-5
4.4	Computer Diagnostics	4-5
4.5	Maintenance Port Parser Commands	4-6
5	Maintenance	5-1
5.1	Warranty/Service Information	5-1
5.2	Preventive Maintenance	5-1
5.3	Replaceable Parts	5-2
5.4	Field Replaceable Unit Procedures	5-3
5.4.1	PCB Removal and Replacement	5-5

5.4.2	RF Detector/DVB Decoder5-6
5.4.3	Antenna Gyro Assembly5-7
5.4.4	Antenna LNB Replacement5-8
5.5	Preparation for Shipment5-9

Appendix A System Specifications

Appendix B Comprehensive TracVision C3 System Wiring Diagram

Appendix C Switchplate Template

Appendix D Startup Data Sequence

Appendix E Maintenance Port Parser Commands

1 Introduction

1.1 Digital Satellite Television

Your new TracVision C3 satellite antenna is fully compatible with the Digital Video Broadcasting (DVB) satellites, which use the international standard for digital TV transmission, as well as Digital Satellite Service (DSS) services, such as DIRECTV. As a result, you will be able to receive and decode signals from your chosen satellite services with the proper programming and hardware (e.g., the IRD [satellite TV receiver]). Your TracVision C3 is also fully compatible with KVH's TracNet™ 2.0 Mobile High-speed Internet System (*for more information, please visit our web site at www.kvh.com.*)

Your TracVision C3 comes with a pre-programmed "satellite library" of European and North American satellite services. When configuring the TracVision C3 you may choose a pair of satellites from the entire library to be active in the system and with your IRD. For the antenna to track and receive signals from two satellites, they must be within 10° longitude of each other in orbit. As a result, certain satellites can be paired only with certain other satellites. Tables 1-1 and 1-2 list the possible satellite pairs that may be selected in Europe and North America. *If the satellite service you wish to receive is not already in the "satellite library," you may also add two additional satellites of your choice to the library.*



TracVision C3's default satellite pairs are:

Europe: Astra 1 & Hotbird

*N. America (US DIRECTV):
DSS_101 & DSS_119
or*

*N. America (US DISH Network):
Echo_119 & None
or*

*N. America (ExpressVu):
Expressvu & None*

Refer to Section 2.5, "Selecting the Active Satellite," for instructions on selecting different satellites.

Table 1-1
*Available European Satellite Pairs
(European LNB required)*

	Astra 1	Astra 2N	Astra 2S	Hispasat	Hotbird	Sirius	Thor
Astra 1		✓	✓		✓	✓	
Astra 2N	✓				✓		
Astra 2S	✓				✓		
Hispasat							
Hotbird	✓	✓	✓			✓	
Sirius	✓				✓		✓
Thor						✓	

Table 1-2
Available N. American Satellite Pairs (U.S.-style LNB required)

	DSS_101	DSS_119	Echo_61	Echo_110	Echo_119	Echo_148	Expressvu
DSS_101		✓					
DSS_119	✓						
Echo_61				✓	✓		✓
Echo_110			✓		✓	✓	✓
Echo_119			✓	✓		✓	✓
Echo_148				✓	✓		✓
Expressvu			✓	✓	✓	✓	

1.2 TracVision C3 System Overview

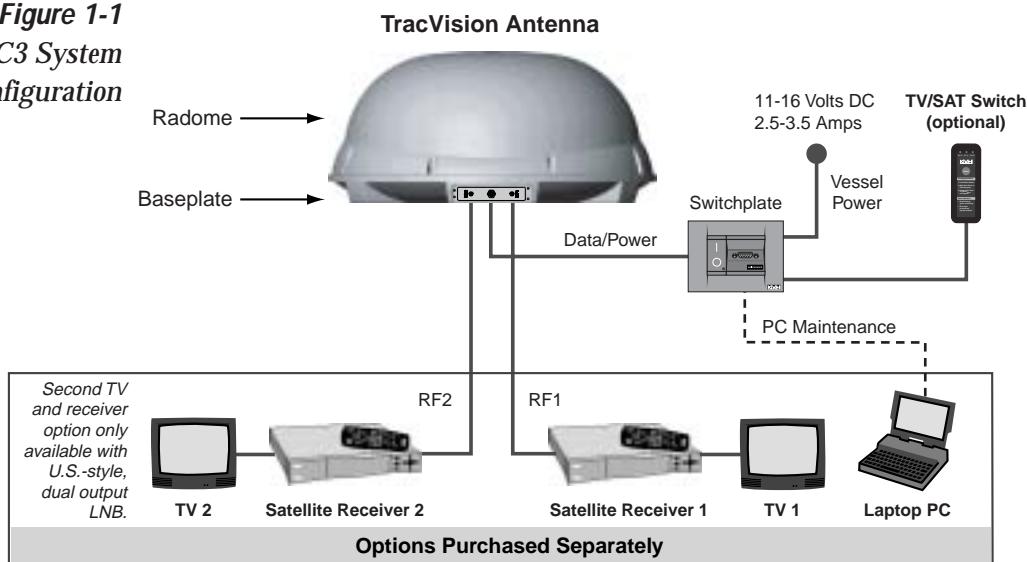


If you are a **DISH 500** customer, you can order the optional TV/SAT Switch – **free of charge**. Simply fill out the order form located at the back of this manual and fax it to KVH at +1 401 845-8190.

Your KVH TracVision C3 employs a state-of-the-art actively stabilized antenna system. Once the satellite is acquired, the antenna gyro continuously measures your vessel's motion and position, and transmits commands to the antenna motors to keep the antenna pointed at the satellite at all times. A complete satellite TV system includes the TracVision C3 connected to an IRD and a television set. The optional TV/SAT Switch allows you to select a satellite at the press of a button. A desktop or laptop computer is used to configure the system for satellite selection and conduct diagnostics. The complete system is illustrated in Figure 1-1.

System specifications and a wiring diagram are provided in Appendices **A** and **B**, respectively.

Figure 1-1
TracVision C3 System Configuration



1.2.1 TracVision C3 Components

The antenna unit includes the antenna positioning mechanism, signal front end, power supply, and control elements. These elements include antenna drive controls and mechanisms, the cable wrap subassembly, antenna gyro sensor, power conditioning and regulating circuits, and the RF detector. The antenna is a parabolic dish mounting a low noise block (LNB) converter with built-in preamplifier. The European configuration includes a single-output LNB while the North American system uses a dual-output LNB. A molded ABS radome encloses the fiberglass baseplate and is secured in place with standard fasteners. Connectors on the back of the baseplate join the power, signal, and control cabling from below-decks units.



The dual-output LNB in the North American systems allows two IRD/TV pairs to be connected directly to the antenna. Three or more pairs can be connected to the system if an active multiswitch is used. Section 2.3.5, “Connecting the Antenna RF Signal Cable to the IRD,” provides installation directions for each of these options.

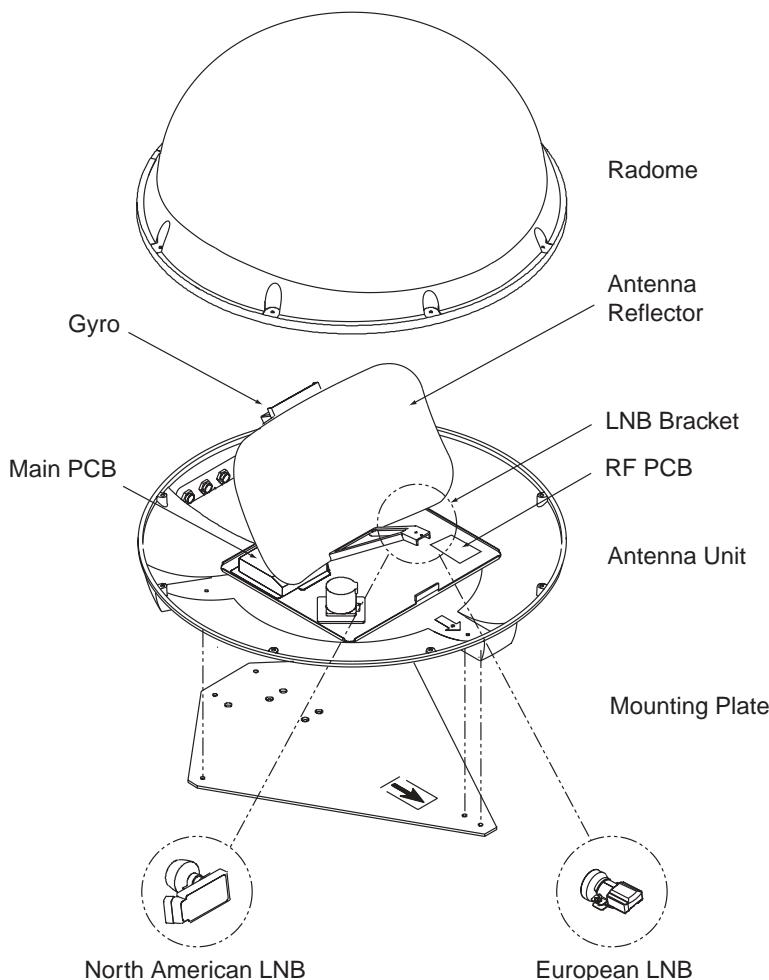


Figure 1-2
Primary Components of the TracVision C3



Always lift the antenna unit by the gray baseplate and not the radome, antenna reflector, or internal mechanical assemblies.

NEVER pick up the unit by the LNB or the gyro!



Before you can start watching satellite TV using your TracVision antenna, you will need to activate your IRD. Refer to Section 2.4, "Activating the IRD," for more details.

1.2.2 Integrated Receiver Decoder (IRD)

The IRD (purchased separately) receives satellite signals from the antenna unit for signal processing and channel selection, and sends the signals to the TV set for viewing. The IRD also provides the interface for the user to activate authorization for reception. Please refer to the User's Manual provided with your selected IRD for complete operating instructions.

1.3 Materials Provided with TracVision C3

Table 1-3 lists the units, cables, and materials packed in the TracVision C3 package by name and KVH part number.

Table 1-3
TracVision C3 Packing List



Cables for the TracVision C3 are stored beneath the antenna unit during shipping.

Component	KVH Part No.
Antenna Unit (comprising):	01-0225-20 [†] 01-0225-23 ^{††} 01-0225-26 ^{†††} 01-0225-29 ^{††††}
Baseplate Assembly	02-1245-01* 02-1245-03**
Radome Assembly	02-953-04
RF Cable (45 ft/14 m)	32-0417-45
Data/Power Cable (45 ft/14 m)	32-0730-45
PC Cable (6 ft/1.8 m)	32-0628-06
Mounting Plate	20-0684
Kitpack***	72-0102
Owner's Manual	54-0159
IRD Ground Wire	32-0583-50
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

[†] European TracVision C3 system

^{††} North American TracVision C3 system (defaulted to DIRECTV)

^{†††} North American TracVision C3 system (defaulted to DISH Network)

^{††††} North American TracVision C3 system (defaulted to ExpressVu)

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

*** A complete listing of kitpack contents is provided in [Table 2-2](#).

1.3.1 Additional Materials Required for TracVision C3 Use

To make full use of your new TracVision C3 and receive satellite TV aboard your vessel, you will need to provide/purchase the following:

- Television
- Appropriate IRD for your selected satellite TV service



In North America, you can purchase and activate an IRD directly from KVH. Call KVH at 1-888-584-4163 for details.

2 Installation

TracVision C3 is designed for simple installation and setup. Just follow these easy steps:

Step	Refer to Section...
1. Choose the hardware locations	2.1
2. Mount the antenna unit	2.2
3. Connect system components	2.3
4. Activate the IRD	2.4
5. Select the active satellite	2.5
6. Set the skew angle (Europe only)	2.6
7. Check out the system	2.7

Table 2-1
Installation Process



Installation Tools and Materials Required

- Electric drill
- $\frac{3}{8}$ " (9.5 mm), $\frac{3}{16}$ " (5 mm), $\frac{5}{32}$ " (4 mm), and $\frac{3}{32}$ " (2.5 mm) drill bits and $\frac{3}{4}$ " (19 mm) hole saw and auger bit
- $\frac{1}{2}$ " wrench
- #2 Phillips and #0 flat tip screwdrivers
- RG-6 or RG-11 (75 ohms) RF cable (if installing two RF cables - refer to [Section 2.3.5](#) for details)
- Silicone sealant, RTV, or Sikaflex
- $\frac{7}{16}$ " open end wrench
- PC with terminal emulation software such as PROCOMM or Windows Terminal or Hyperterminal

Plan the entire installation before proceeding! Take into account component placement, cable running distances between units, and accessibility to the equipment after installation.

Kitpack Contents

Table 2-2 lists the materials provided in the kitpack.

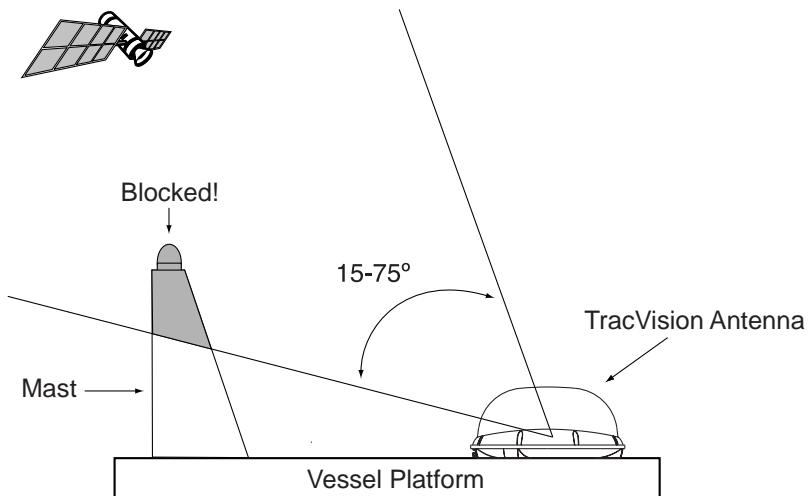
Table 2-2
Kitpack Contents

Part	Qty.	KVH Part No.
Tie-wraps	5	22-0013
1/4"-20 x 3" hex head cap screws	6	14-0250-48
1/4"-20 x 5/8" hex screws	4	14-0250-0010
1/4" flat washers	10	14-0251
Switchplate bulb assembly (spare)	1	19-0193

2.1 Choosing the Best Location

- Since the TracVision antenna requires a clear view of the southern sky to receive satellite signals, the ideal antenna site has an unobstructed view of the horizon/satellite all around.
- Keep the antenna clear of any obstructions above decks. The antenna requires a 15° to 75° look angle to receive satellite signals.

Figure 2-1
Antenna Blockage



- The closer the antenna reference is aligned with the vessel's centerline, the smaller the pool of tracking errors will be.
- Place the antenna unit as close as possible to the intersection of the vessel's fore-and-aft centerline and midships.

- The antenna unit should not be too high off the water (a height above the waterline no more than half the vessel length).
- Make sure that the mounting surface is rigid so that it cannot flex when the vessel vibrates. If necessary, add a strength member to the mounting site to stiffen it.

Radar Concerns

The TracVision antenna must be kept out of line with nearby radars, as their energy levels may overload the antenna's front-end circuits. In an ideal installation, the antenna is mounted four feet above and four feet away from the radar (measured from the center of the antenna dome to the center of the radar).

The best placement for the TracVision antenna is above the radar. However, if there will be a significant horizontal separation between the radar and TV dome (i.e., at least 8 to 10 feet), the TracVision antenna can be placed below the radar as there will be little chance of signal blockage.



Always lift the antenna unit by the gray baseplate, never by the radome or any portion of the antenna assembly!



The antenna's baseplate connectors may face either forward or backward along the centerline of the vessel for more convenient installation.

2.2 Mounting the Antenna Unit

The following instructions will result in a secure, effective installation and trouble-free operation of your TracVision C3.

Antenna Mounting Procedure

1. Make sure that you have chosen a suitable mounting location based upon the guidelines in [Section 2.1, "Choosing the Best Location."](#)
2. Remove the antenna unit from its shipping carton.
3. Remove and save the 8 pan head screws and flat washers that secure the radome to the baseplate. Carefully lift the radome straight up until clear of the antenna assembly and set aside.
4. Position the antenna unit in the desired location on the centerline of the vessel with the baseplate and mounting plate arrows facing in the same direction (either forward or aft). The mounting plate dimensions and ideal orientation of the system are illustrated in Figures 2-2 and 2-3, respectively.

Figure 2-2
Mounting Plate Dimensions

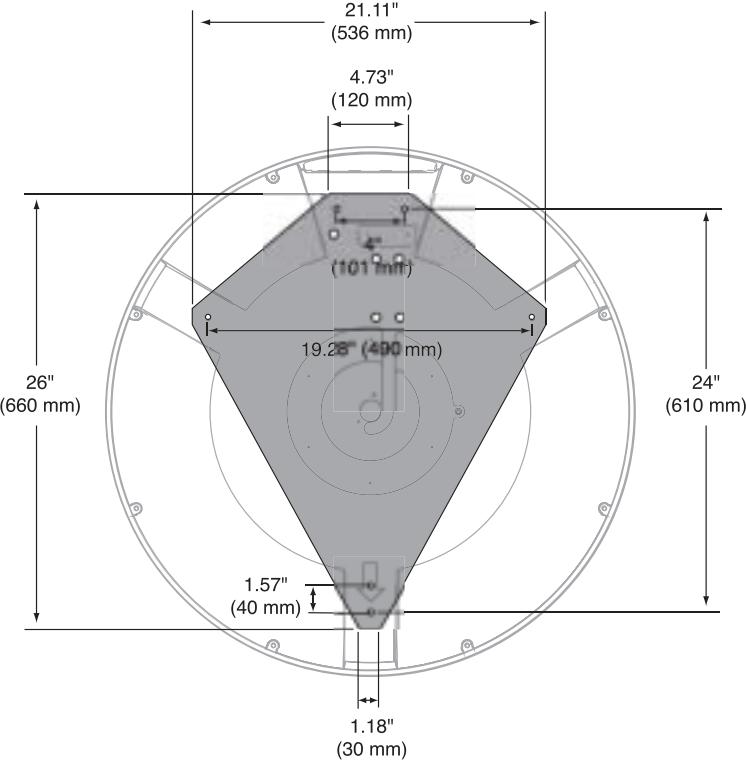
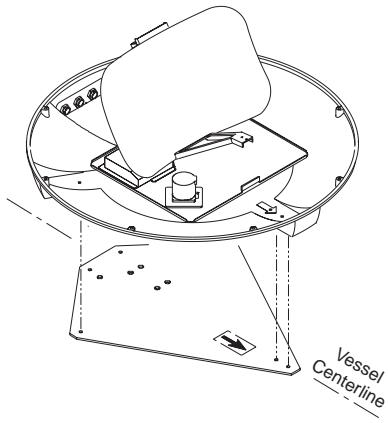


Figure 2-3
Proper Orientation of
the Antenna Unit



5. While the antenna unit is in place, mark a location on the deck for the $\frac{3}{4}$ " (19 mm) cable access hole to permit convenient cable access to the antenna's baseplate connectors.
6. Cut the tie-wraps holding the antenna unit to the forward shipping restraint (see Figure 2-4).

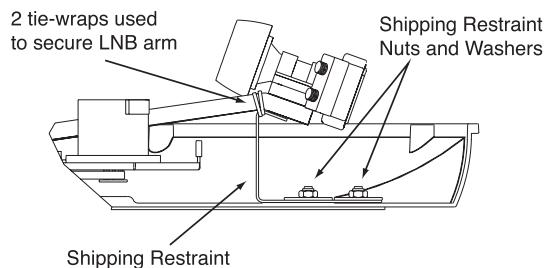


Figure 2-4
*Forward Shipping Restraint
(Arranged for Shipping)*

7. Remove the nuts and washers that secure the antenna baseplate and shipping restraints to the mounting plate. The positions of all the shipping restraints are pictured in Figure 2-5.

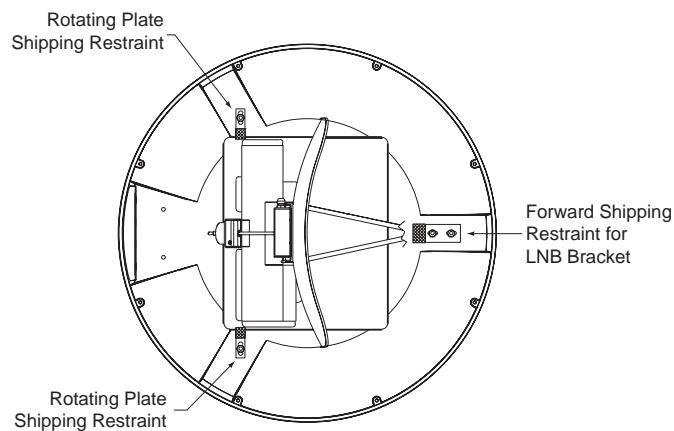


Figure 2-5
*TracVision C3 Shipping Restraints
(Top View, Installed for Shipping)*

8. Remove the antenna unit from the mounting plate.
9. Reposition the mounting plate in the desired location on the centerline of the vessel.
10. Using the mounting plate as a template, lay out the locations of the six mounting holes (also pictured in Figure 2-2). Drill the six $\frac{3}{8}$ " (9.5 mm) holes in the mounting surface and apply a bead of silicone sealant around each hole.



Do not discard the shipping restraints. They should be stowed for future use in case the antenna unit needs to be removed and shipped to another location.

11. Reposition the mounting plate over the drilled mounting holes, lining up the the mounting plate holes with the holes in the mounting surface. Apply a bead of silicone sealant around each of the six mounting holes on the top surface of the mounting plate.
12. Place the antenna unit on top of the mounting plate, making sure all holes are aligned.
13. (*Optional*) For convenient storage, the shipping restraints may be rotated 180° and secured to the mounting bolts (see Figures 2-6 through 2-8).

Figure 2-6
Forward Shipping Restraint Storage

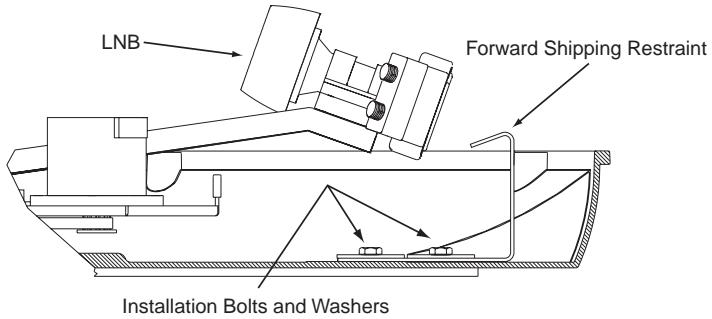


Figure 2-7
Rotating Plate Shipping Restraint Storage

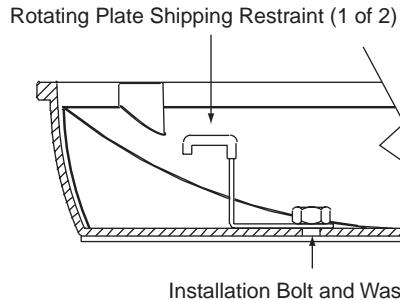
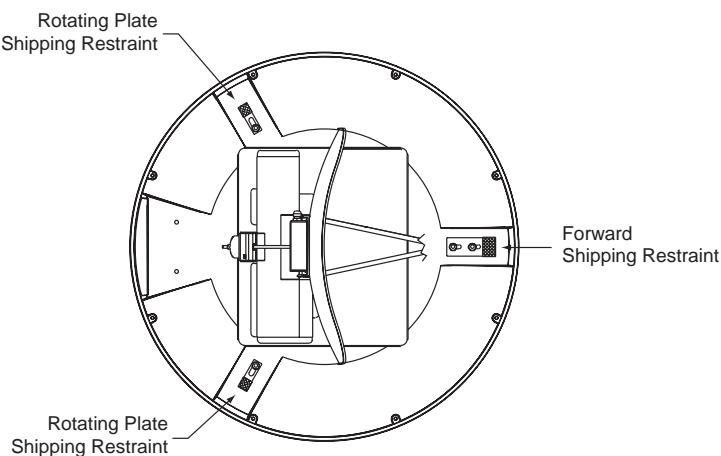


Figure 2-8
**TracVision C3 Shipping Restraints
(Storage Position)**



14. At each hole, place a $\frac{1}{4}$ " flat washer on a $\frac{1}{4}$ "-20 x 3" bolt (from the kitpack) and insert it into the mounting hole from above (see Figure 2-9).

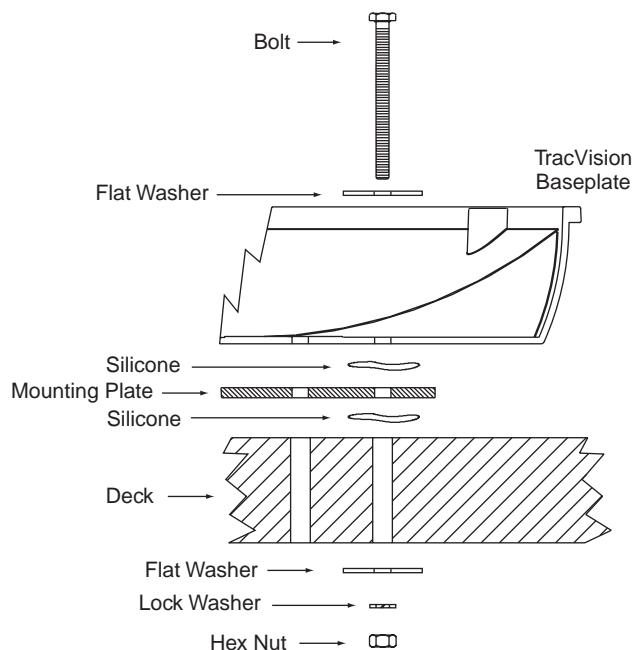


Figure 2-9
*Securing TracVision C3
to the Deck*

15. Apply a flat washer, lock washer, and nut (removed in Step 7) to each mounting bolt from below decks and tighten securely.

16. When the antenna unit is installed with the baseplate connectors facing the stern of the vessel, the drain holes are located as shown in Figure 2-10.

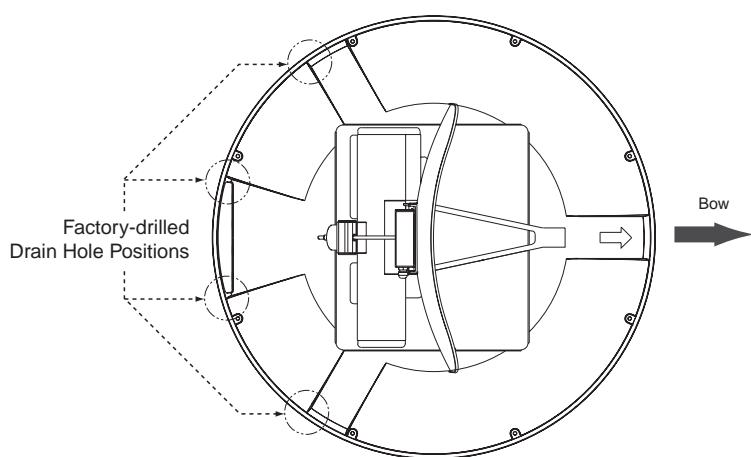


Figure 2-10
*Baseplate Connectors Facing Rear
of Vessel – Factory-drilled
Drain Hole Locations*

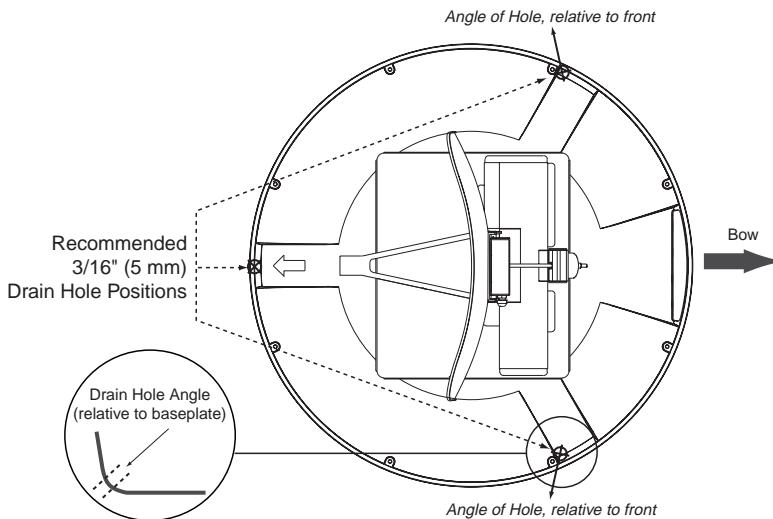
16a. (*Alternate Drain Hole Locations*) If the antenna unit is installed with the baseplate connectors facing the bow of the vessel, drill out $\frac{3}{16}$ " (5 mm)-drain holes in the rear-facing side of the baseplate as illustrated in Figure 2-11. The existing factory-drilled drain holes shown in [Figure 2-10](#) must then be plugged with silicone rubber sealant.

Figure 2-11

Baseplate Connectors Facing Front of Vessel – Recommended Drain Hole Locations



You **MUST** drill out the drain holes as indicated to ensure that any moisture that enters the baseplate is able to drain. Ensure that factory-drilled holes are completely sealed.



17. Place the radome onto the baseplate (labels facing the sides of the vessel) and secure in place using the 8 pan head screws and flat washers removed in [Step 3](#).

18. Drill the cable access hole (marked in [Step 5](#)).

2.3 Connecting System Components

The following sections provide instructions for properly wiring the antenna unit to belowdecks components.

Locating the Switchplate

A switchplate has been provided to serve as the hub of the TracVision C3 wiring (with the exception of the RF cable, which will be connected to the IRD). This switchplate includes an ON/OFF switch and a DB9 maintenance port for easy access to the antenna unit's software and diagnostics. Follow the steps below to select and prepare the switchplate mounting location.

1. Select a location to mount the TracVision C3 switchplate. It should be installed in a dry, flat location within reach of the cables that will connect to the antenna unit.
2. Once you've decided on a suitable location, create a panel cutout in the mounting surface.

Figure 2-12 illustrates the mounting dimensions and a template has been provided in [Appendix C](#). The connecting cables will be routed through this cutout.

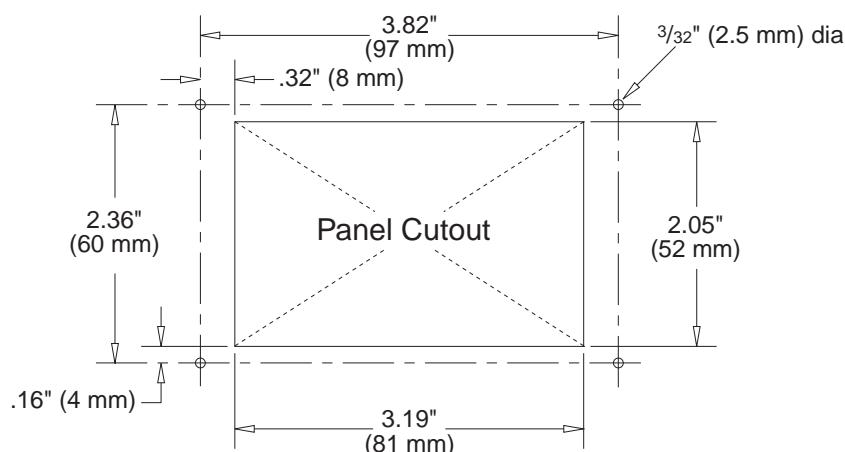


Figure 2-12
Switchplate Panel
Cutout Dimensions

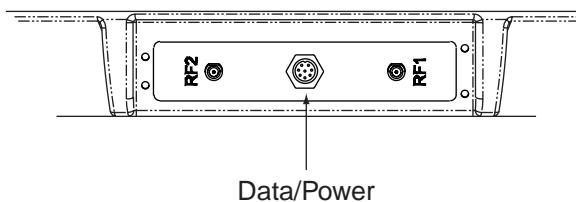


A full-scale panel cutout template has been provided in [Appendix C](#).

2.3.1 Connecting the Antenna Data/Power Cable

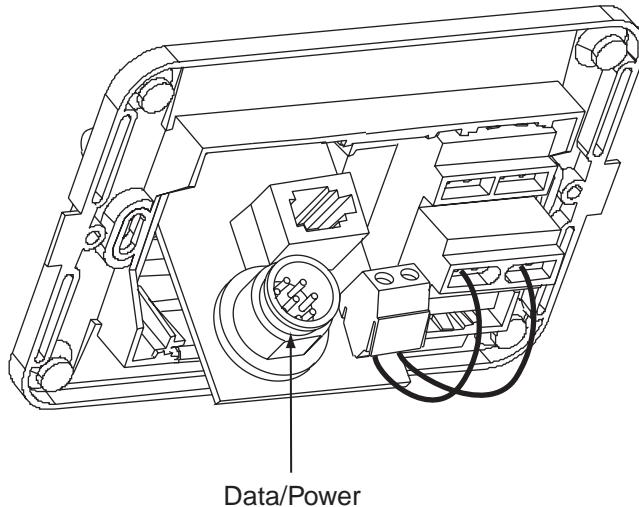
1. Connect one end of the antenna data/power cable to the antenna's data/power connector and lock in place (see Figure 2-13).

Figure 2-13
Antenna Data/Power Connector



2. Route the other end of the data/power cable down through the cable access hole in the deck and out through the switchplate panel cutout.
3. Connect the data/power cable to the switchplate's data/power connector and lock in place (see Figure 2-14).

Figure 2-14
Switchplate Data/Power Connector



2.3.2 Connecting to Vessel Power

Recommended Power Wiring

Short circuits may result in severe electrical shock or burns. Turn off vessel power and test the circuit to ensure that no power is present before connecting the power cable.

The switchplate requires an 11-16 VDC power input. A quick-tripping circuit breaker or fuse should be installed between the switchplate and vessel power. Circuit overload protection should be rated for 5 amperes. If vessel power fluctuates widely or is noisy, a 12 VDC 5-amp AC/DC power supply or a wide-range DC/DC converter power supply should be installed. *Test the voltage and polarity before making connections to vessel power.*

Connecting the Power Cable to the Switchplate

1. Disconnect vessel power by removing the appropriate vessel fuse.
2. Connect the switchplate to vessel power as pictured in Figure 2-15.



Before connecting the antenna unit to vessel power, remove the appropriate vessel fuse to prevent a short circuit.

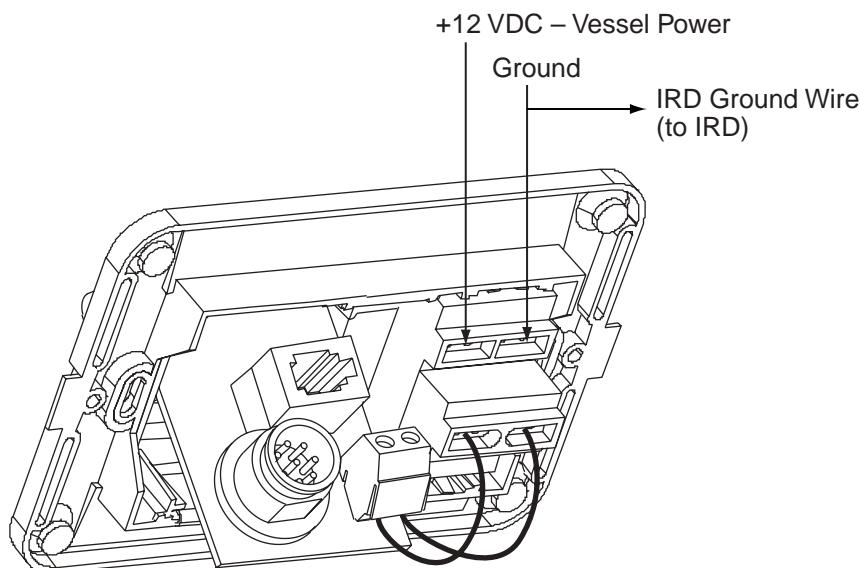


Figure 2-15
Switchplate Power Wiring

2.3.3 Connecting the IRD Ground Wire

A grounding wire (Cable #32-0583-50) has been provided to connect your IRD to a suitable ground and protect the system. Attach the grounding wire to any suitable screw on the rear panel of the IRD with a good contact with the IRD chassis. The other end should be connected to a suitable ground, ideally the ground connector on the switchplate (see [Figure 2-15](#)).

2.3.4 Installing the Switchplate

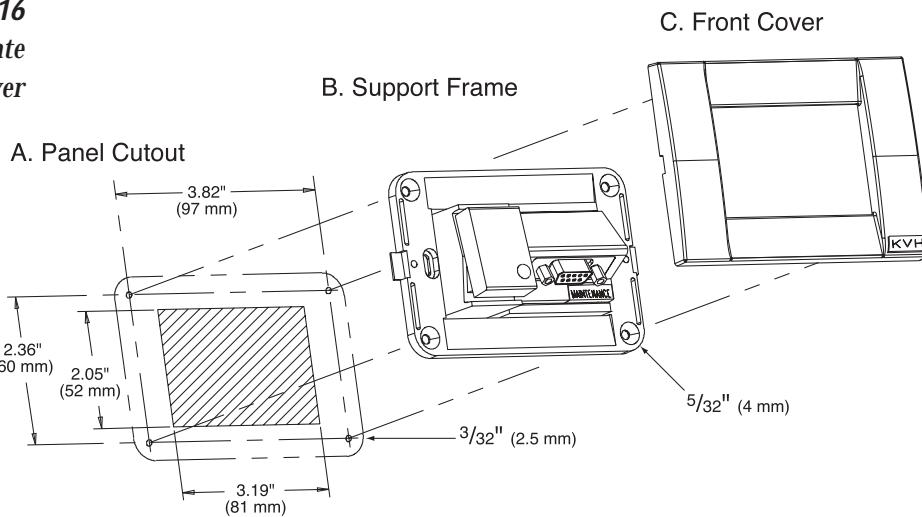
After completing the switchplate wiring process, you must install the switchplate itself. This process, detailed in the following steps, is illustrated in [Figure 2-16](#).

Figure 2-16
Mounting the Switchplate
Support Frame and Front Cover



Before securing the switchplate to the mounting surface, be sure to strain-relieve the wires connecting to the switchplate connectors.

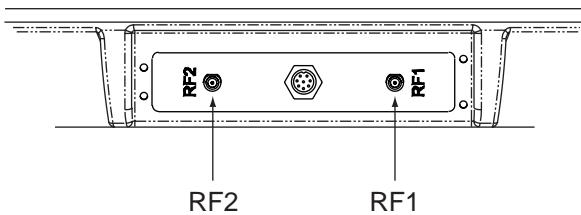
Several tie-wraps have been provided to aid in strain-relieving the wires.



1. Fit the switchplate assembly and support frame into the panel cutout made in Step 2 of [Section 2.3, “Connecting System Components,”](#) and flush to the mounting surface.
2. Drill out four $\frac{5}{32}$ " (4 mm) holes in the countersunk settings in the switchplate support frame.
3. Drill four $\frac{3}{32}$ " (2.5 mm) holes in the mounting surface using the countersunk holes in the support frame as the template. Secure the support frame and switchplate assembly to the mounting surface using four #6 self-cutting screws.
4. Snap the front cover into place to cover the screws and support frame.
5. Reinstall the vessel fuse removed in Step 1 of [Section 2.3.2, “Connecting to Vessel Power.”](#)

2.3.5 Connecting the Antenna RF Signal Cable to the IRD

1. Route an RF cable up through the deck's cable access hole.
2. Connect the RF cable to the antenna's RF1 connector (see Figure 2-17). Once the cable is securely connected, loosen the sealing nut at the base of the RF1 connector and tighten it onto the end of the RF cable.



3. Connect the other end of the RF cable to the IRD's SATELLITE IN connector.

2.3.5.1 Installing Two IRDs and TVs (North American Systems Only)

To connect a second TV and IRD to the TracVision C3 system, you must connect a second RF cable to the antenna's RF2 connector (see Figure 2-17). Route the other end of the RF cable down into the vessel and connect it directly to the second IRD.



When shipped from the factory, the antenna's RF connectors are protected with caps. Leave the cap installed on the RF2 connector unless you are going to connect a second RF cable to the TracVision C3.

Figure 2-17
Antenna RF Connectors



KVH recommends the use of RG-6 or RG-11 (75 ohms) cable for RF wiring. Use of non-RG-6 or RG-11 (75 ohms) cables will result in degraded performance. The KVH warranty does not cover degraded performance due to improper wiring.

2.3.5.2 Connecting Three or More IRDs and TVs (North American Systems Only)

To install three or more IRD/TV pairs, an active multiswitch (Channel Master model 6214IFD or equivalent) must be placed between the antenna unit and the IRDs. Figure 2-18 illustrates typical wiring arrangements for multiple IRDs. Mount the multiswitch unit in accordance with the manufacturer's instruction sheet.

Figure 2-18

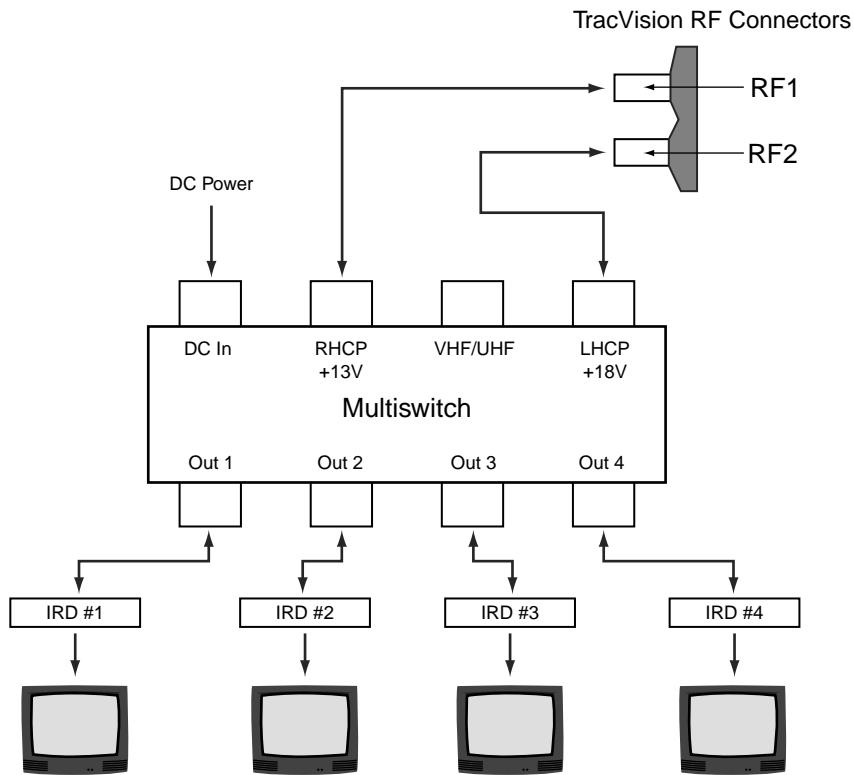
*Installing Three or More IRDs
Using an Active Multiswitch
(North American Systems Only)*



TracVision C3 has the capability to switch from one satellite to another when you choose TV channels that are carried by your two selected satellites. However, the use of an active multiswitch may interfere with the 22 KHz tone sent by DIRECTV DSS Plus™ IRDs to the antenna. As a result, the antenna may not receive the signal to change satellites when you change channels using your DIRECTV DSS Plus remote.

In this case, you will need to use the optional TV/SAT Switch* or a PC as described in Section 3.2, "Changing Channels and Switching Between Satellites."

* To order a TV/SAT Switch (KVH Part Number 01-0245), please call +1 401 847-3327.

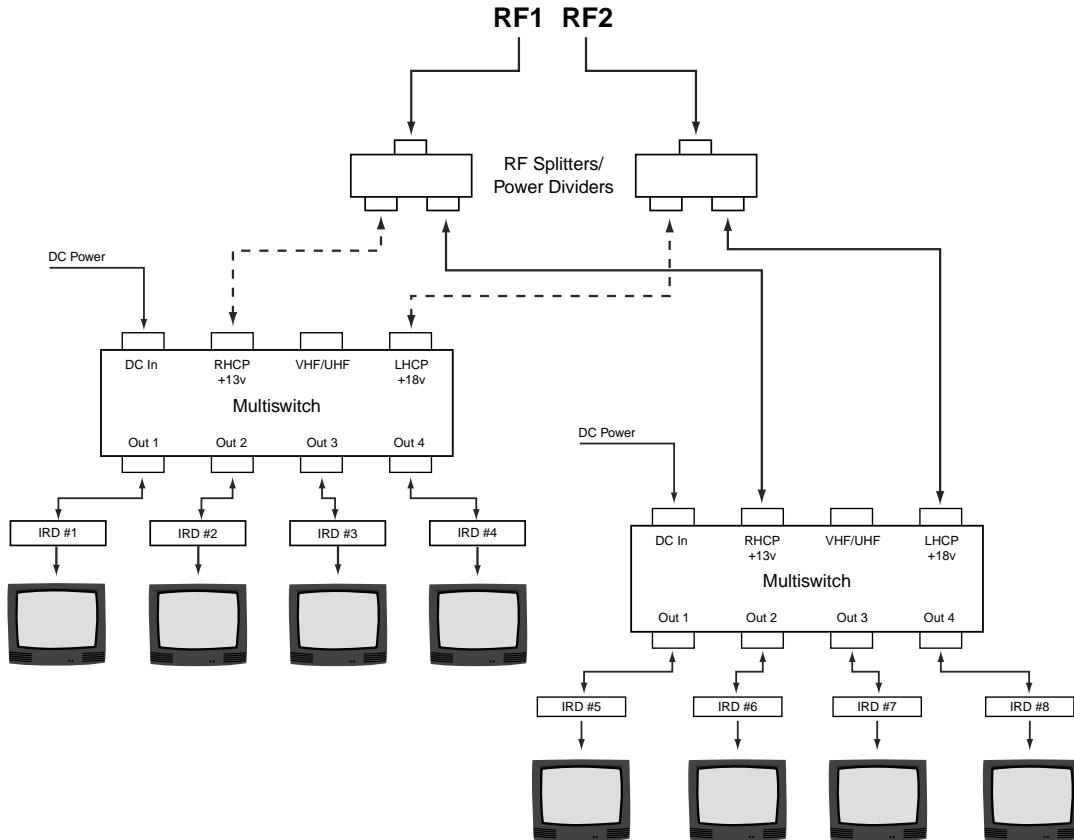


1. Connect the RF cable tagged "RF1" to the multiswitch input labeled "LNB RHCP +13V."
2. Connect a second RF cable to the multiswitch input labeled "LNB LHCP +18V."
3. Connect the multiswitch outputs to individual IRD inputs. Use RG-6 cable terminated with F-type connectors for all RF connections.
4. Terminate all unused output connectors with 75 ohm DC blocks (Channel Master #7184, Radio Shack #15-1259 or equivalent).

Installing More than One Multiswitch

If there is a need for more than four IRDs, it is possible to carry out a multiple multiswitch installation, as illustrated in Figure 2-19.

Figure 2-19
Connecting to Multiple
Multiswitches (North American
Systems Only)



2.4 Activating the IRD

DIRECTV and DISH Network IRD Activation

KVH makes it easy to activate your DIRECTV or EchoStar (DISH Network) IRD. Just call KVH at 1-888-584-4163 and ask for **IRD Activation** (Monday - Friday, 8:30 a.m. - 5:00 p.m. EST). For other options, please refer to the user manual that accompanied your IRD.

Other IRD Activations

Please refer to the user manual that accompanied your IRD for activation instructions.

2.5 Selecting the Active Satellite

As noted previously, TracVision C3 can track a variety of DVB-compatible and DSS (DIRECTV) satellites. The system contains a preprogrammed library of European and North American satellites. It also has two open slots that you may use to program two additional satellites of your choice. Tables 2-3 and 2-4 provide listings of the possible satellite pairs. Two of these satellites may be selected to reside in the system's active memory as Satellites A and B.

Table 2-3
Available European Satellite Pairs
(European LNB required)

	Astra 1	Astra 2N	Astra 2S	Hispasat	Hotbird	Sirius	Thor
Astra 1		✓	✓		✓	✓	
Astra 2N	✓				✓		
Astra 2S	✓				✓		
Hispasat							
Hotbird	✓	✓	✓			✓	
Sirius	✓				✓		✓
Thor						✓	

Table 2-4
Available N. American Satellite Pairs (U.S.-style LNB Required)

	DSS_101	DSS_119	Echo_61	Echo_110	Echo_119	Echo_148	Expressvu
DSS_101		✓					
DSS_119	✓						
Echo_61				✓	✓		✓
Echo_110			✓		✓	✓	✓
Echo_119			✓	✓		✓	✓
Echo_148				✓	✓		✓
Expressvu			✓	✓	✓	✓	

The satellites listed in TracVision C3's preprogrammed satellite library will be sufficient for most users. However, if you wish to install one or two user-defined satellites, proceed to [Section 2.5.2, "Programming User-defined Satellites."](#) After configuring the user-defined satellites, return to the satellite installation process in [Section 2.5.1, "Installing Your Selected Satellites."](#)

2.5.1 Installing Your Selected Satellites

When you first connect to the system, it is programmed with the factory default satellite assignments:

- Europe: Astra 1 (Sat A) and Hotbird (Sat B)
- N. America (US DIRECTV): DSS_101 (Sat A) and DSS_119 (Sat B)
- N. America (US DISH Network): Echo_119 (Sat A) and None (Sat B)
- N. America (ExpressVu): Expressvu (Sat. A) and None (Sat. B)

Should you wish to track a different satellite (either from the satellite library or a user-defined satellite), you must instruct the antenna which satellites will be in the active satellite pair.

Connecting to the TracVision C3 Maintenance Port

To do so, it is necessary to connect a PC to the terminal maintenance port on the switchplate. The diagnostics procedure requires terminal emulation software such as PROCOMM or Windows Terminal or Hyperterminal. Use the settings appropriate to your application.

1. Connect one end of the PC data cable to the DB9 connector on the switchplate. Connect the other end to the serial port on the PC (a 9-pin/25-pin connector adapter may be needed for some PCs).
2. Open the terminal emulation software and establish the following settings:
 - 9600 baud
 - no parity
 - 8 data bits
 - 1 start bit
 - 1 stop bit
 - no flow control



The satellite configuration on your IRD must match the satellite setting on the TracVision C3 system.

*Satellite A on the TracVision C3 must be the same satellite as IRD Alternative 1 (or A, based on your IRD) and must be assigned the IRD DiSEqC 1 setting.**

*Satellite B on the TracVision C3 must be the same satellite as IRD Alternative 2 (or B, based on your IRD) and must be assigned the IRD DiSEqC 2 setting.**

Refer to your IRD user manual for complete instructions for your IRD.

** DiSEqC settings only apply to European systems.*

3. Apply power to the TracVision C3 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

Installing the Satellite of Choice

Once the data connection has been made between the PC and the TracVision C3, you must assign the satellites you wish to have in the satellite pair. On the maintenance screen, put the antenna in Idle Mode by typing **HALT**, then enter the SATINSTALL command:

Satellite	Install Name	Command: SATINSTALL,<sat_a_name>,<sat_b_name><cr> (<cr> indicates a carriage return/ENTER key)
European Satellites		
ASTRA1 19.2°E	ASTRA1	Where: <sat_a_name> = the name of your choice for Satellite A
ASTRA2N 28.2°E	ASTRA2N	<sat_b_name> = the name of your choice for Satellite B
ASTRA2S 28.2°E	ASTRA2S	
Hispasat 30.0°W	HISPASAT	
Hotbird 13.0°E	HOTBIRD	
Sirius 5.0°E	SIRIUS	
Thor 0.8°W	THOR	
North American Satellites		
DSS 101°W	DSS_101	Command: @L,x<cr>
DSS 119°W	DSS_119	Where: x = A or B (one of your selected satellites as defined during the SATINSTALL process)
EchoStar 61°W	Echo_61	
EchoStar 110°W	Echo_110	
EchoStar 119°W	Echo_119	
EchoStar 148°W	Echo_148	
ExpressVu	Expressvu	
Other Installation Designations		
User-defined 1	USER1*	
User-defined 2	USER2*	
None	None	

* USER1 and USER2 will only be available if one or two user-defined satellites have been added to the library as detailed in Section 2.5.2, “Programming User-defined Satellites.”

Table 2-5 lists the assigned names for satellites that are in the preprogrammed European and North American satellite library. If you do not wish to assign a pair of satellites, enter **None** as the name of Satellite B.

After you have assigned satellites as Satellites A and B, the final step is to tell the antenna which of the two satellites it should acquire and track. This step should be carried out the first time a satellite is selected, allowing the system to carry out the initial download of the channel guide. To do so, enter the Satellite Selection parser command as follows:

Command:	@L,x<cr>
Where:	x = A or B (one of your selected satellites as defined during the SATINSTALL process)

Choosing A or B will assign the antenna to acquire and track that installed satellite. To complete the process, type **ZAP<cr>** to restart the system. Be sure the IRD satellite configuration matches your chosen TracVision C3 settings.

For example, to assign Astra 2S and Hotbird for your satellite pair, and to track Astra 2S, you would enter the following data:

```
SATINSTALL,ASTRA2S,HOTBIRD<cr>
```

```
@L,A<cr>
```

```
ZAP<cr>
```

2.5.2 Programming User-defined Satellites

The TracVision C3 satellite library has two open slots that you may use to program two user-defined satellites in case you want to install/watch a satellite that is not in the KVH predefined list. To configure a user satellite, the system must first be in Idle Mode (by typing **HALT**) and then information about the satellite must be provided, including:

- Satellite name
- Satellite position (longitude)
- Transponder information for each of the following polarizations/frequencies:
 - vertical high & vertical low
 - horizontal high & horizontal low
- or**
- right
- left
- Transponder information includes:
 - frequency
 - symbol rate
 - FEC code, and
 - network ID (in hexadecimal format)
- Decoder type

This information can be obtained from your satellite service provider or from sites on the Internet, such as www.satcodx.com.



For your reference, the satellite configuration information for the predefined satellites is available on our web site at www.kvh.com/footprint/index.html.

Entering User-defined Satellite Data

Once the link between the PC and the TracVision C3 is established as described in [Section 2.5, “Selecting the Active Satellite,”](#) it is necessary to provide initial longitude data regarding the user-defined satellite. To do so, enter the SATCONFIG parser command via PC as follows:

Command:	SATCONFIG,USERX,YYY,Z,D,L<cr> (<cr> indicates a carriage return/ENTER key)
Where:	X = 1 or 2 (satellite alternative) YYY = longitude (0-180) Z = E (East) or W (West) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB) L = LNB polarization (C = circular, L = linear)
Function:	configures one of the user-configurable satellites with the longitude provided
Response:	if valid entry, echoes the input data if invalid entry, returns error message

After entering the SATCONFIG command, you must turn on the DEBUG mode by typing **@DEBUGON**. Following the entry of the SATCONFIG and DEBUGON commands, enter the satellite transponder information via PC as follows:

Command:	@SATCONFIG,X,N,F,S,C,ID,P,B,D<cr>
Where:	<p>@SATCONFIG = directs data to the RF Board</p> <p>X = satellite location A or B</p> <p>N = satellite table # (98 & 99 are slots for user-configured satellites)</p> <p>F = frequency in MHz (either 00000 or a range from 10700 - 12700)</p> <p>S = the satellite transponder symbol rate in Mbit/second (01000 - 29999)</p> <p>C = the FEC code (e.g., 12, 23, 34, 56, 67, 78)</p> <p>ID = the satellite network ID in hexadecimal format (0x#####)</p> <p>P = the LNB polarization (v = vertical, h = horizontal, r = right, l = left)</p> <p>B = the LNB down conversion frequency (l = low, h = high, u = USA)</p> <p>D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)</p>

This information has to be entered for each of the four transponder categories:

- vertical high • vertical low
- horizontal high • horizontal low

or

- right • left

TracVision C3 requires that the data fields for all four transponder categories be provided. If the selected satellite does not have information for one or more of the transponder categories, default information should be entered in the fields as follows:

Transponder Data	Default Value
Frequency	00000
Symbol Rate	27500
FEC Code	the same value as provided for those transponders with data
Network ID	0x0000
Polarity and Band	whichever combinations are not already provided

Table 2-6
Default Transponder Values

After entering this information, it is necessary to save these settings. To do so, type:

@SAVE,A (or **@SAVE,B** if data is for User2 satellite)
@DEBUGOFF

After completing this process, restart the system by either cycling power or typing **ZAP**.

One of your user-defined satellite options has now been added to the TracVision C3 satellite library. This option will now be available the next time the SATINSTALL command is given.

An Example of Configuring a User-defined Satellite (Europe)

The following is an example of configuring the fictional YOURSAT 101 as the USER1 configured satellite. Prior to configuring this satellite or any others, be certain to get the most up-to-date information from one of the sources previously discussed.

Table 2-7
Sample User-defined Satellite Configuration (Europe)

YOURSAT 101 at 7 West, DVB decoder, Linear Polarization LNB	
<i>Horizontal High</i>	
Frequency	11.966 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048 (dec) = 0x0800
<i>Vertical High</i>	
Frequency	11.823 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048(dec) = 0x0800
<i>Vertical Low</i>	
No Data Listed	
<i>Horizontal Low</i>	
No Data Listed	

Based on this information, the data entered via the PC would look like this, assuming that YOURSAT 101 would be Satellite A:

```
SATCONFIG,USER1,7,W,3,L
@DEBUGON
@SATCONFIG,A,98,11966,27500,34,0x0800,H,H,3
@SATCONFIG,A,98,11823,27500,34,0x0800,V,H,3
@SATCONFIG,A,98,00000,27500,34,0x0000,V,L,3
@SATCONFIG,A,98,00000,27500,34,0x0000,H,L,3
@SAVE,A
@DEBUGOFF
ZAP
```

An Example of Configuring a User-defined Satellite (N. America)

The following is an example of configuring the fictional YOURSAT 101 as the USER1 configured satellite. Prior to configuring this satellite or any others, be certain to get the most up-to-date information from one of the sources previously discussed.

YOURSAT 101 at 71 West, DVB decoder, Circular Polarization LNB

<i>Right</i>	
Frequency	11.966 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048 (dec) = 0x0800
<i>Left</i>	
Frequency	11.823 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048(dec) = 0x0800

Table 2-8
Sample User-defined Satellite Configuration (N. America)

Based on this information, the data entered via the PC would look like this, assuming that YOURSAT 101 would be Satellite A:

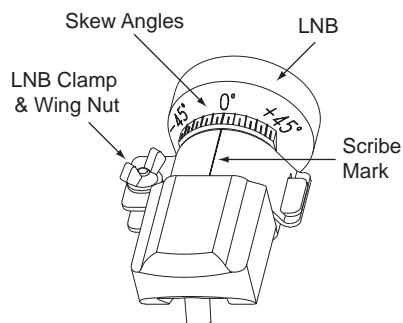
```
SATCONFIG,USER1,71,W,3,C
@DEBUGON
@SATCONFIG,A,98,11966,27500,34,0x0800,R,U,3
@SATCONFIG,A,98,11823,27500,34,0x0800,L,U,3
@SAVE,A
@DEBUGOFF
ZAP
```

2.6 Setting the Skew Angle (European Systems Only)

The Antenna LNB skew angle must be adjusted to optimize channel reception. Refer to your satellite service provider for the proper skew angle for the selected satellite service and geographical location. The skew angle for KVH predefined satellites can also be obtained by using a PC connected to the maintenance port. Enter your latitude and longitude using the GPS command (refer to [Appendix E.6](#) for details) and then type **SKEWANGLE**. The system will respond with the skew angle for whichever satellite is currently selected.

Adjusting the LNB Skew Angle

Figure 2-20
Skew Adjustment



1. Determine the skew angle for the selected satellite and region.
2. Loosen the wing nut on the LNB clamp so that the LNB can be moved.
3. Carefully rotate the LNB so that the scribe mark on the LNB clamp is aligned with the proper angle measurement.
4. Tighten the wing nut and LNB clamp to secure the LNB.

2.7 Checking Out the System

To complete the TracVision C3 installation, it will be necessary to verify that the system functions properly. Critical to ensuring that the system is configured and operating properly is to check the system startup routine to ensure that the system is operating within normal parameters.

To do so, it is necessary to connect a PC to the terminal maintenance port. The diagnostics procedure requires terminal emulation software such as PROCOMM or Windows Terminal or Hyperterminal. Use the settings appropriate to your application.

1. Connect one end of the PC data cable to the DB9 connector on the switchplate. Connect the other end to the serial port on the PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

2. Open the terminal emulation software and establish the following settings:
 - 9600 baud
 - no parity
 - 8 data bits
 - 1 start bit
 - 1 stop bit
 - no flow control
3. Apply power to the TracVision C3 system and the IRD and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup. A *sample startup sequence has been provided in Appendix D.*
4. After completing the review of the startup and operational routines, turn on the IRD and television and check the channels on the selected satellites. For European systems, view both horizontally and vertically polarized channels, if possible.
5. When all checks are completed, shut down the system.



*If a need arises to paint the radome, **only use non-metallic paint** to avoid degrading the RF signal strength and the reception quality. The KVH warranty does not cover degraded performance resulting from a painted radome.*

2.8 Changing Geographic Location

If you move from Europe to the U.S., or from the U.S. to Europe, you will need to modify your TracVision C3 system to receive satellite TV signals in the new geographic area.

To begin receiving satellite signals in the new area, perform the following steps.

Swap LNBs

To receive the proper satellite signals in the new geographic location, your TracVision antenna must be equipped with the appropriate LNB for that location. If moving from Europe to the U.S., you will need to install a North American-style LNB. If moving from the U.S. to Europe, you will need to install a European-style LNB. Table 2-9 lists the part numbers for ordering these LNB options.

Table 2-9
LNB Part Numbers

Part Name	Part Number
European-style LNB	19-0196
North American-style LNB	19-0056

With the new part, you will receive an easy-to-understand instruction sheet for swapping the LNBs.

Install New Satellites

When you move to a new area, the list of available satellites changes. If you're moving to Europe, you will need to choose a new satellite pair from the list of available European satellites (see [Table 2-3](#)). If you're moving to the U.S., you will need to choose a new satellite pair from the list of available North American satellites (see [Table 2-4](#)). For details on installing these new satellites, refer to [Section 2.5.1, "Installing Your Selected Satellites."](#)



You may also need to replace your television when changing geographic location. In North America, your TV must support the NTSC video standard. In Europe, your TV must support the PAL video standard.

Replace the IRD

In order to receive satellite TV service in your new geographic location, you will need to purchase an IRD designed for that location. Refer to your satellite TV service provider for more information.

3 Using Your TracVision C3

For TracVision C3 to receive the satellite signals, the antenna must have a clear line of sight to the satellite. If you only receive intermittent signals or the antenna cannot find the satellite, check around your vessel for any objects that could be blocking the signal, such as other vessels, trees, buildings, other onboard equipment, etc.

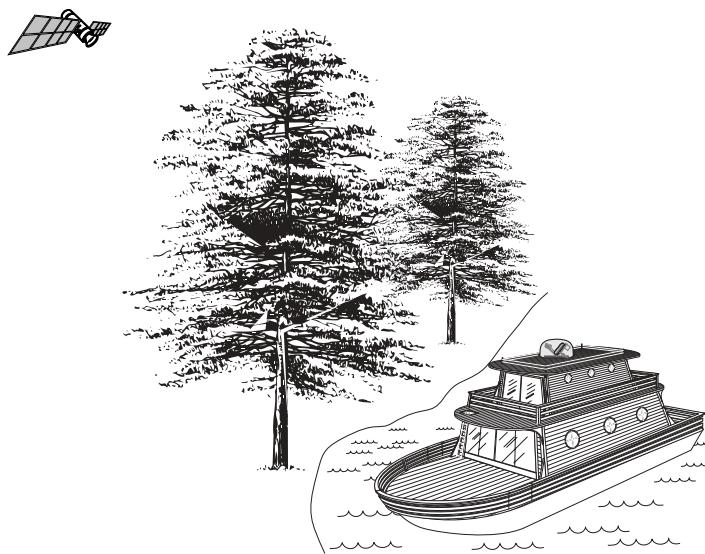


Figure 3-1
Be Aware of Objects that Might Block the Satellite Signals

You must also be located within the selected satellite's coverage area in order to receive its signal. Refer to your satellite television service manual to check the viable coverage area. *For your convenience, KVH provides links to several web sites that offer satellite coverage information. Simply go to our web site at: www.kvh.com/footprint/index.html.*

3.1 Turning On the System

The TracVision C3 system is easy to use. Antenna unit initialization and satellite acquisition are completely automatic.

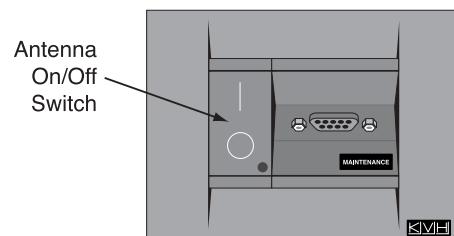
To use the TracVision C3 system:

1. Turn on the IRD and the television. (Refer to your IRD user manual for complete operating instructions for the IRD.)
2. Turn on the antenna using the switchplate, as pictured in Figure 3-2.



To minimize the time it takes the antenna to acquire the satellite, do not change the channel during the startup process or cable unwrap.

Figure 3-2
*Turning on the TracVision C3
Using the Switchplate*



3. Avoid turning the vessel for 60 seconds after turning on the antenna to allow the antenna gyro to initialize properly.

3.2 Changing Channels and Switching Between Satellites

If you have followed the installation instructions, your system should be set to the active satellite pair of your choice and the system should have downloaded the appropriate channel guides. You must also have a properly configured IRD (if this has not been done, refer to your IRD User's Manual for instructions for your specific IRD).



*If you are a **DISH 500** customer, you can order the optional TV/SAT Switch – **free of charge**. Simply fill out the order form located at the back of this manual and fax it to KVH at +1 401 845-8190.*

Your TracVision system is programmed to track either of two satellites, stored in memory as Satellite A and Satellite B. You can use the IRD remote control, the optional TV/SAT Switch, or a PC to select between the two satellites.

3.2.1 Using the IRD Remote Control to Switch Between Satellites



The satellite configuration on your IRD must match the satellite setting on the TracVision C3 system.

Satellite A on the TracVision C3 must be the same satellite as IRD Alternative 1 (or A, based on your IRD) and must be assigned the IRD DiSEqC 1 setting.*

Satellite B on the TracVision C3 must be the same satellite as IRD Alternative 2 (or B, based on your IRD) and must be assigned the IRD DiSEqC 2 setting.*

Refer to your IRD user manual for complete instructions for your IRD.

*DiSEqC settings only apply to European systems.

When the TracVision C3 system and the IRD have matching configurations, switching from one satellite to the other is as easy as changing the channel using the remote control. TracVision C3 will automatically switch from Satellite A to B and back again as necessary to receive your selected channel.

DIRECTV Satellite Subscribers

DIRECTV subscribers in certain regions of the United States will require a DSS Plus IRD to receive both satellite and alternative programming. Check with DIRECTV for regional requirements.

If connected to the antenna's RF1 connector, the DSS Plus IRD allows you to switch channels using the remote control. If you are a DIRECTV subscriber, but do not have a DSS Plus IRD, or you are using a multiswitch, use the optional TV/SAT Switch* or a PC, as described in the following sections.

* To order a TV/SAT Switch (KVH Part Number 01-0245), please call +1 401 847-3327.

EchoStar Satellite Subscribers

EchoStar subscribers will need to use the optional TV/SAT Switch or a PC to change satellites, as described in the following sections.

3.2.2 Using the TV/SAT Switch to Switch Between Satellites - *Optional*

If you are a DISH 500 customer, or you're unable to switch between satellites using the IRD remote control, you can use the optional TV/SAT Switch (see Figure 3-3) to easily select between Satellite A and Satellite B.

TV/SAT Switch Controls and Indicators

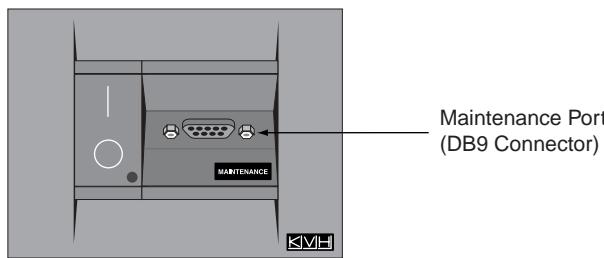
The Select button is used for all operator controls. The TV/SAT Switch also has three LED indicators that show its current status. Table 3-1 explains the function of each indicator.

Indicator	Status	Meaning
Sat A	Blinking green	Wait – Searching for satellite
	Solid green	Tracking Satellite A
Error	Blinking red	System problem – Refer to Section 4, “Troubleshooting,” to find the possible cause
Sat B	Blinking green	Wait – Searching for satellite
	Solid green	Tracking Satellite B

Connecting the TV/SAT Switch

To use the TV/SAT Switch, you must first connect it to the TracVision system.

1. Connect the TV/SAT Switch's data cable to the maintenance port on the switchplate (see Figure 3-4).



2. The Sat A and Sat B indicators blink while the system initializes.
3. Either the Sat A or Sat B indicator will turn solid green, denoting which satellite is currently being tracked.

Figure 3-3
TV/SAT Switch

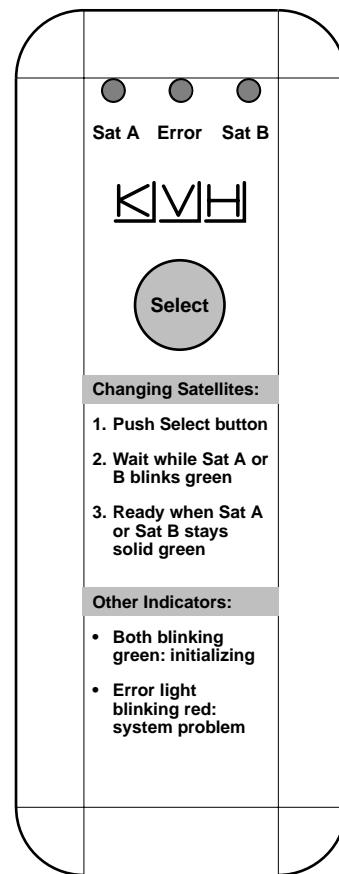


Table 3-1
TV/SAT Switch LED Indicators

Figure 3-4
Switchplate Maintenance Port

Using the TV/SAT Switch

The TV/SAT Switch is very easy to use. All operations are controlled through the single Select button.

To select the second satellite, perform the following steps:

1. Press the Select button on the TV/SAT Switch.
2. The indicator for the current satellite (Sat A or Sat B) extinguishes, while the indicator for the other satellite starts blinking.
3. Once the indicator for the other satellite turns solid green, the TracVision system is tracking the newly selected satellite. You can now use your IRD to choose a channel on the new satellite.



If you are a **DISH 500** customer, you can order the optional TV/SAT Switch – **free of charge**. Simply fill out the order form located at the back of this manual and fax it to KVH at +1 401 845-8190. Please take advantage of this free offer to make satellite switching a breeze!

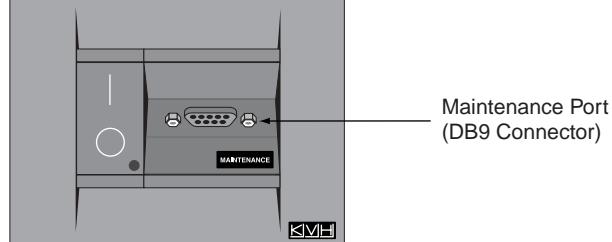
3.2.3 Using a PC to Switch Between Satellites

If you're unable to switch between satellites using the IRD remote control, you can use a PC connected to the switchplate's maintenance port to select between Satellite A and Satellite B. The procedure requires terminal emulation software such as PROCOMM or Windows Terminal or Hyperterminal. Use the settings appropriate to your application.

To switch satellites using a PC, perform the following steps:

1. Connect one end of the PC data cable to the maintenance port on the switchplate (see Figure 3-5). Connect the other end to the serial port on your PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

Figure 3-5
Switchplate Maintenance Port



2. Open the terminal emulation software and establish the following settings:

- 9600 baud
- no parity
- 8 data bits
- 1 start bit
- 1 stop bit
- no flow control

3. Once the data connection is made, enter the Satellite Selection command as follows:

Command: **@L,x<cr>**
(<cr> indicates a carriage return/ENTER key)

Where:	x = A or B (whichever satellite you want to track)
--------	--

To select Satellite A, you would enter **@L,A<cr>**.

To select Satellite B, you would enter **@L,B<cr>**.

4. The antenna unit shifts to track the second satellite.

3.3 Watching Television

TracVision C3 is designed to operate as efficiently and as reliably as possible both when your vessel is in motion and at rest.

Cable Unwrap

The antenna unit can rotate a full 720° before coming to the end of its cable. If it does so, the system automatically unwraps the cable by quickly rotating the dish in the opposite direction. During this process, your television transmission will be frozen momentarily while the cable unwraps and the antenna reacquires the satellite.

Sleep Mode

When the vessel has come to a stop and the antenna holds its position for 1 minute (e.g., at a dock), the antenna unit enters Sleep Mode, which turns off the conical scan tracking, reducing any motor noise the antenna may be making. As soon as the vessel moves beyond a 1° window, Sleep Mode will automatically be turned off and the system will begin tracking the satellite again. This convenient feature is ideal for when a vessel is docked and passengers want to watch TV.

KVH recognizes that some customers may not want to take advantage of this convenient feature. In this case, it is possible to disable Sleep Mode using a simple software command as follows:

1. Connect a laptop computer to the system using the maintenance port and a terminal emulation program, as described in *Section 2.5.1, “Installing Your Selected Satellites.”*
2. Turn on the antenna. When the limit switch test is complete:
 - a. Type **HALT<cr>** (*<cr> indicates a carriage return/ENTER key*).
 - b. Type **DEBUGON<cr>**.
 - c. Type **SLEEPOFF<cr>**.
3. Cycle the antenna’s power. Sleep Mode is now disabled.
4. To reactivate Sleep Mode, follow this same process, except type **SLEEPON<cr>** in Step c.

Conical Scan Tracking

The antenna control unit uses conical scanning to maintain peak signal strength to the receiver and to update the satellite’s position. When conical scan tracking is active, the antenna moves continually with a circular motion to sweep across the satellite’s peak signal. The signal strength is then fed back to the control circuits to keep coming back to the direction of the strongest signal.

If the satellite signal is lost while the system is in conical scan track mode, the control software imposes a 45-second time-out delay. If the signal is not regained during that time, the antenna reverts to the set of Search Modes to start looking for the satellite signal. This is an automatic process that does not require user intervention.

3.4 Internet Access

Your TracVision C3 can receive high-speed Internet data when used in conjunction with KVH’s TracNet 2.0 Mobile High-speed Internet System. With TracNet 2.0, you get broadband Internet access on the move via satellite downloads and a wireless return path. For more information about TracNet 2.0 in North America and Europe, please visit our web site at www.kvh.com.

4 Troubleshooting

The troubleshooting matrix shown in Table 4-1 identifies some trouble symptoms, their possible causes, and references to troubleshooting solutions.

Table 4-1
Troubleshooting Matrix

SYMPTOM	POSSIBLE CAUSE (AND SOLUTION)									
	Blown fuse or improper wiring (Section 4.1.1)	Vessel turning during startup (Section 4.1.1)	Satellite configuration (Section 4.1.2)	Dew or rain blocked (Section 4.1.3)	Satellite coverage on dome (Section 4.1.4)	Radar interference issue (Section 4.1.5)	Incorrect or loose RF connectors (Section 4.1.6)	Type of multiswitch used (Section 4.1.7)	IRD faulty or improperly configured (Section 4.1.8)	Antenna gyro faulty (Section 4.1.9)
Antenna non-functional	X									
Antenna not switching channels/satellites		X				X	X			
No picture on TV set			X	X	X	X	X	X		X
Intermittent picture for short intervals		X	X	X	X	X	X		X	X
System works at rest but not on the move			X							X
System will not find satellite	X	X	X		X	X	X			X
Snowy television picture						X		X		
Picture jumbled, parts missing, freezing			X	X	X	X		X		
TV/SAT Switch Error LED blinking						X		X	X	X

4.1 Causes and Remedies for Common Operational Issues

There are a number of common issues that can affect the signal reception quality or the operation of the TracVision C3. The following sections address these issues and potential solutions.

4.1.1 Blown Fuse or Improper Wiring

If the antenna unit is installed but entirely non-responsive, there are two key factors to check as part of the troubleshooting process:

1. Blown Fuse – The antenna unit is equipped with two fuses mounted on its CPU Board. If either of these fuses has blown or been broken, the antenna unit will not operate. Refer to [Section 5.4.1, “PCB Removal and Replacement,”](#) for details on the fuse locations and how to access the CPU Board.
2. Wiring – If the system has been improperly wired, the antenna unit will not operate correctly. Refer to [Section 2.3, “Connecting System Components,”](#) for complete system wiring information.

4.1.2 Vessel Turning During Startup

If the vessel turns during the 60-second startup and initialization sequence that occurs immediately after turning on the power to the TracVision C3 unit, the antenna gyro will record that variable motion as “standing still.” This may cause the antenna to track improperly. To solve this problem, turn the TracVision C3 off for at least 10 seconds. Turn the system back on, making certain that the vessel is either motionless or travelling in a straight line for the 60 seconds immediately following power-up.

4.1.3 Incorrect Satellite Configuration

The satellite configuration on your IRD must match the satellite setting on the TracVision C3 system.

- Satellite A on the TracVision C3 must be the same satellite as IRD Alternative 1 (or A, based on your IRD) and must be assigned the IRD DiSEqC 1 setting.*
- Satellite B on the TracVision C3 must be the same satellite as IRD Alternative 2 (or B, based on your IRD) and must be assigned the IRD DiSEqC 2 setting.*

* DiSEqC settings apply only to European systems.

Refer to your IRD user manual for complete instructions on configuring your IRD.

4.1.4 Satellite Signal Blocked

Satellite signals can be blocked or degraded by building, trees, other vessels, or equipment on the vessel itself. Refer to *Section 2.1, “Choosing the Best Location,”* to make certain that the TracVision C3 unit is in the optimal location. Simply moving the vessel to clear an external obstruction will also restore signal quality.

4.1.5 Dew or Rain Pooling on Dome

Dew or rain can occasionally pool on the top of the radome. While this moisture will usually be dispersed when the vessel is in motion, it can disrupt the signal while the vessel is at rest. This issue can be minimized with two approaches:

1. Spray the dome with hosed water to remove the dew from the dome's surface.
2. Periodically apply liquid dish detergent to the dome's surface. Wipe the full-strength detergent on the dome and allow it to dry. This treatment will provide a film that will help moisture roll off the dome.

4.1.6 Satellite Coverage Issue

TracVision C3 will provide outstanding reception throughout the entire coverage area for your satellite television service of choice. However, signal quality can be degraded as you approach the fringe coverage areas. Refer to your satellite television service manual to check the viable coverage area.



For your convenience, KVH provides links to several web sites that offer satellite coverage information. Simply go to our web site at www.kvh.com/footprint/index.html.

4.1.7 Radar Interference

The energy levels radiated by radar units can overload the antenna front-end circuits. Refer to *Section 2.1, “Choosing the Best Location,”* to make certain that the TracVision C3 unit is in the optimal location with regard to your radar unit.



Baseline RF levels are included as part of the startup sequence provided in Appendix D.

4.1.8 Incorrect or Loose RF Connectors

As part of preventive maintenance (described in [Section 5, “Maintenance”](#)) KVH recommends checking the antenna unit cable connections. A loose RF connector can reduce the signal quality. In addition, if you are unable to switch to the other programmed satellite, make sure that you have connected your RF signal cable to the antenna baseplate connector labeled “RF1” (see [Section 2.3.5, “Connecting the Antenna RF Signal Cable to the IRD”](#)).

4.1.9 Type of Multiswitch Used *(North American Systems Only)*

An active (not passive) multiswitch must always be used to connect the TracVision C3 system to multiple IRDs. Refer to [Section 2.3.5, “Connecting the Antenna RF Signal Cable to the IRD”](#) for directions on proper multiswitch/multiple IRD cabling.

4.2 IRD Troubleshooting

The IRD that was provided with your satellite television service may also be the cause of less-than-ideal operation. First check the IRD’s configuration to ensure it is set up for the desired programming. In the case of a faulty IRD, refer to your IRD user manual for service and warranty information. If the IRD is both configured properly and fully functional, contact your local KVH dealer or service center for assistance.

4.3 Antenna Gyro and LNB Faults

Section 5, “Maintenance,” provides detailed instructions for authorized service personnel who may be required to replace the TracVision C3 antenna gyro or the LNB.

4.4 Computer Diagnostics

TracVision C3 has been designed to provide diagnostic readouts viewed on a personal computer having an RS-232 serial communication port. If you are unable to isolate a system problem with the foregoing troubleshooting tools, set up for computer diagnostics as described below. System problems will most likely be found somewhere through the diagnostic readouts.

The diagnostics procedure requires terminal emulation software such as PROCOMM or Windows Terminal or Hyperterminal. Use the settings appropriate to your application.

1. Connect one end of the PC data cable to the DB9 connector on the switchplate. Connect the other end to the serial port on the PC (a 9-pin/25-pin connector adapter may be needed for some PCs).
2. Open the terminal emulation software and establish the following settings:
 - 9600 baud
 - no parity
 - 8 data bits
 - 1 start bit
 - 1 stop bit
 - no flow control
3. Apply power to the TracVision C3 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

4.5 Maintenance Port Parser Commands

TracVision C3 system parser commands are detailed in [*Appendix E*](#).

5 Maintenance

5.1 Warranty/Service Information

For information on KVH warranty, repair, and liability policies, please refer to the [complete warranty statement](#) provided at the conclusion of this manual. If you have any questions, please call your local authorized dealer/installer or distributor, or contact KVH or KVH Europe directly.

5.2 Preventive Maintenance

TracVision C3 requires minimal preventive maintenance. The following tasks are sufficient to maintain peak performance.

Monthly

- Wash the exterior of the radome and baseplate assembly with fresh water; a mild detergent may be added to remove grime. Do not spray the radome directly with high-pressure water.
- Do not apply abrasive cleaners or volatile solvents such as acetone to the ABS radome.



When cleaning the radome, avoid any compounds that react with plastic.

Annually

- Remove the radome and examine the interior of the antenna unit for signs of corrosion, loose connections, or frayed or broken wires.
- Visually inspect the elevation drive shaft to be certain that it moves easily and is clear of grit and debris.



*The serial number of your TracVision C3 will be required during any troubleshooting or service calls. You will find the **serial number** at the front of this manual.*

5.3 Replaceable Parts

TracVision C3 has been designed with durability and low maintenance in mind. If you experience an operating problem or otherwise require technical assistance, contact your local authorized TracVision C3 dealer/distributor first. Have the antenna unit serial number ready with a list of the trouble symptoms. If an authorized dealer/distributor is not located nearby, contact the factory directly at the telephone, facsimile, or e-mail listings inside the front cover.

Replacement part numbers for units that can be serviced in the field are listed in Table 5-1. These parts may be obtained from any KVH authorized dealer/distributor.

Table 5-1
Field Replaceable Units

Part Name	Part Number
Baseplate Assembly	02-1245-01* 02-1245-03**
Radome Assembly	02-0953-04†
Data/Power Cable	32-0730-45
RF Cable	32-0417-45
PC Cable	32-0628-06
CPU PCB	02-1043-02
RF PCB	02-1233
Antenna Gyro	02-1035
Antenna Gyro Gasket	24-0139
System Fuses	16-0017-3150
LNB (European system)	19-0196
LNB (N. American system)	19-0056
Switchplate	02-1023-01
TV/SAT Switch (<i>optional</i>)	01-0245

* Baseplate assembly with single-output LNB

** Baseplate assembly with dual-output LNB

† Specify color when ordering



Should a fuse ever need to be replaced, TracVision C3 uses two 5x20mm, 3.15-amp, 250-volt fast-blow fuses.



*To help us continually improve the quality and reliability of our systems, please return any failed component to KVH or KVH Europe (care of the **mailing address** listed at the front of this manual) after you receive your replacement part.*

It is recommended that all other technical difficulties be resolved by returning the TracVision C3 unit to an authorized service provider.

5.4 Field Replaceable Unit Procedures

The following subsections provide detailed procedures for repairing or swapping out field replaceable units. The procedures refer to labeled items presented on the following diagrams.



Always lift the antenna unit by the gray baseplate, never by the radome or any portion of the antenna assembly!

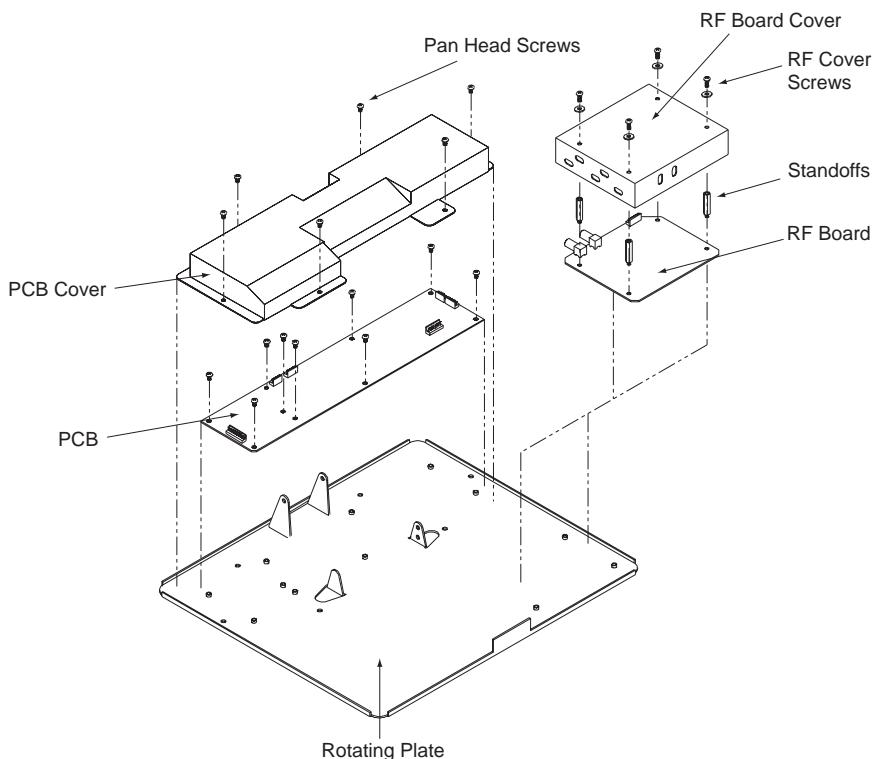


Figure 5-1
Antenna, PCBs, and Rotating Plate



Before servicing the antenna unit, be sure to disconnect power from the antenna unit and the IRD. Reconnect power after completing the service.

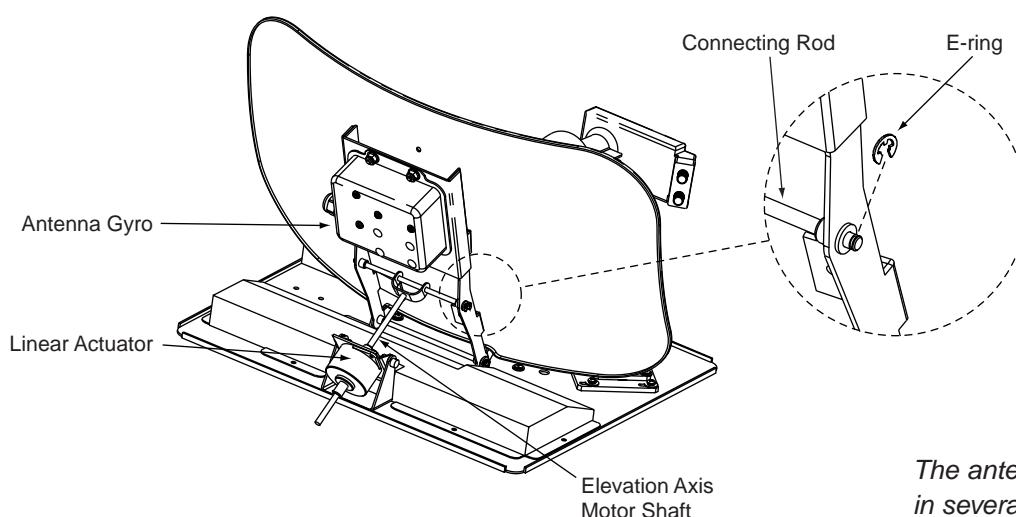


Figure 5-2
Close-up of Connecting Rod and E-ring



The antenna reflector is not shown in several figures for clarity purposes only. Do not remove the antenna reflector!

Figure 5-3
Antenna Assembly

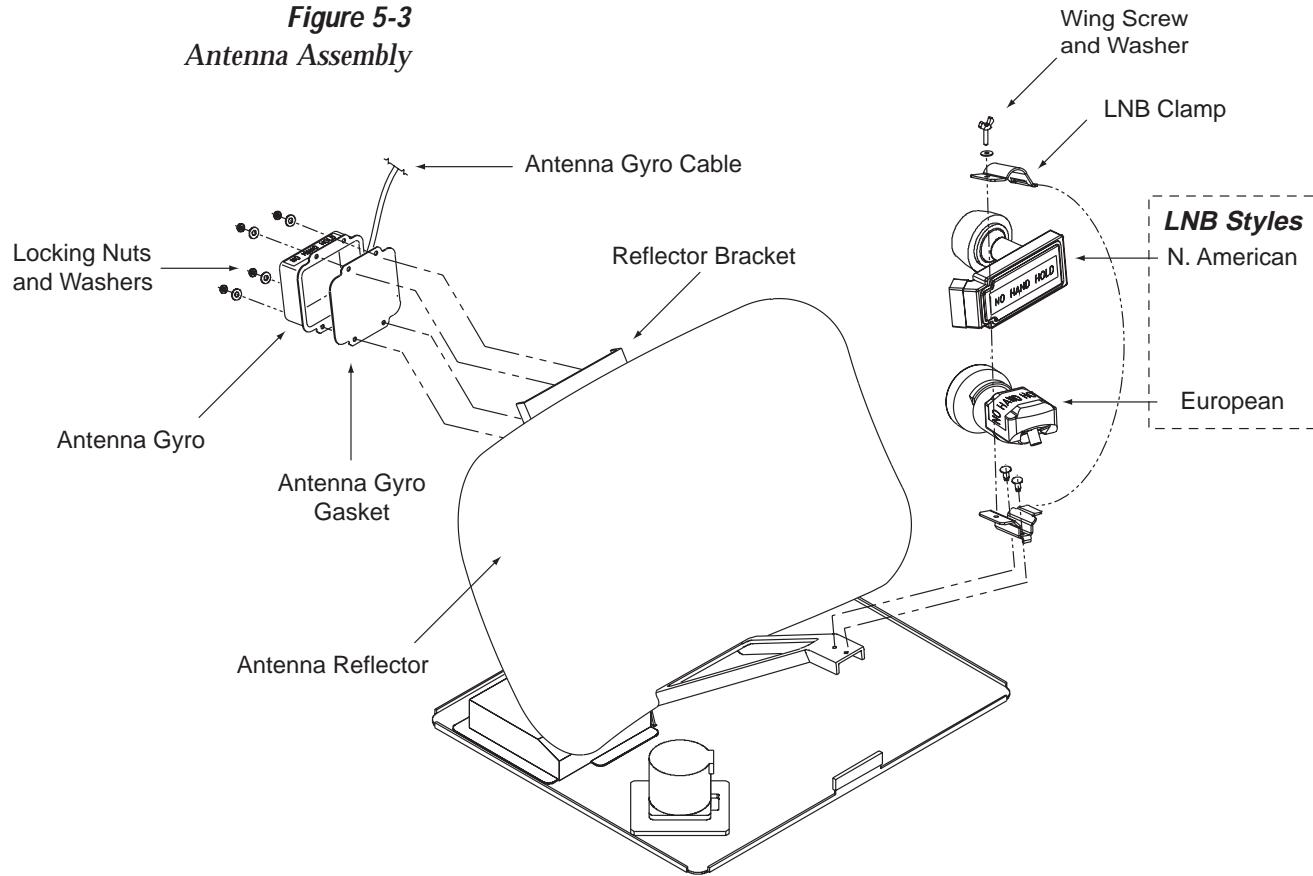
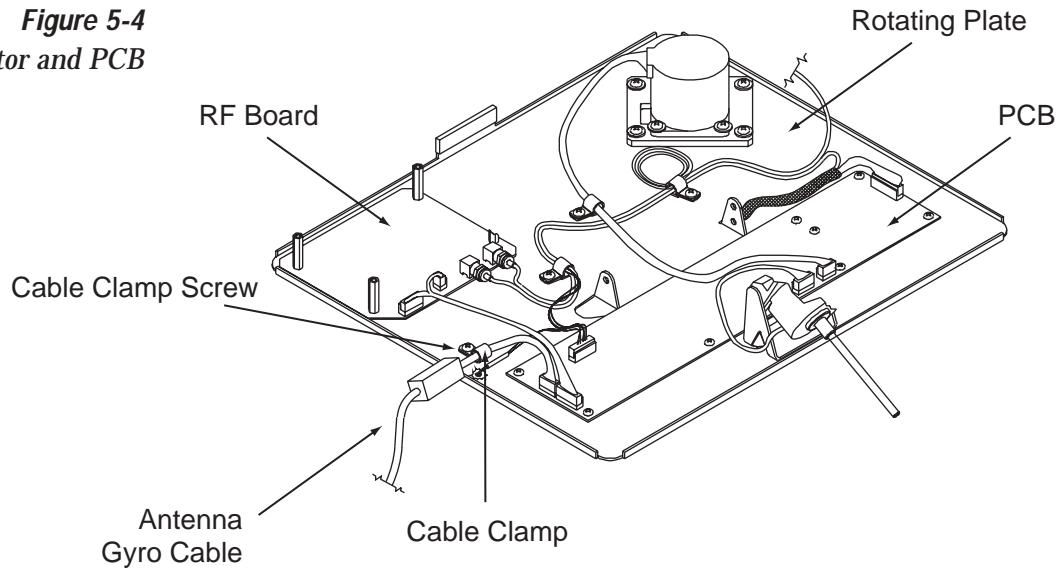


Figure 5-4
Close-up of RF Detector and PCB

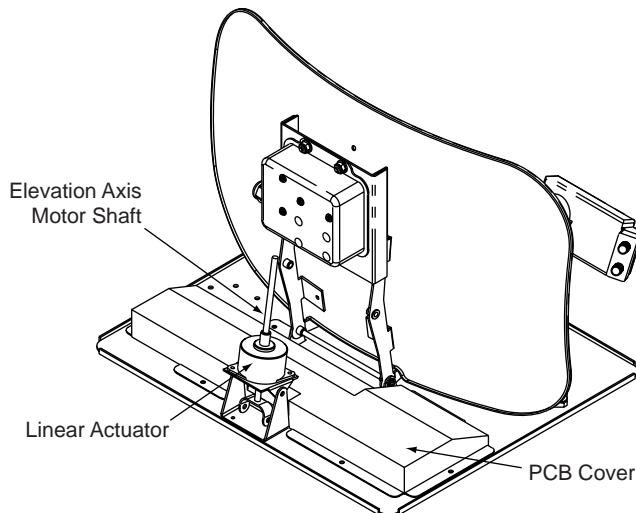


5.4.1 PCB Removal and Replacement

Estimated Time to Repair: $\frac{1}{2}$ hour

The microprocessor PCB assembly is protected by a cover fastened to the rotating plate – *Fig. 5-1*. The cover must be removed to gain access to the main power fuses and the PCB assembly.

1. Using needle-nose pliers, remove the E-ring from one end of the connecting rod – *Fig. 5-2*.
2. Remove the connecting rod by sliding it off the bracket.
3. Fully retract the elevation axis motor shaft – *Fig. 5-5*.



4. Remove the 6 pan head screws from the PCB cover flanges.
5. Remove the PCB cover. To get the necessary clearance, rotate the linear actuator up 90° while lifting the PCB cover – *Fig. 5-5*.
6. Remove all cable connectors from the PCB. *Figure 5-6* on the following page illustrates the PCB arrangement and connector locations.



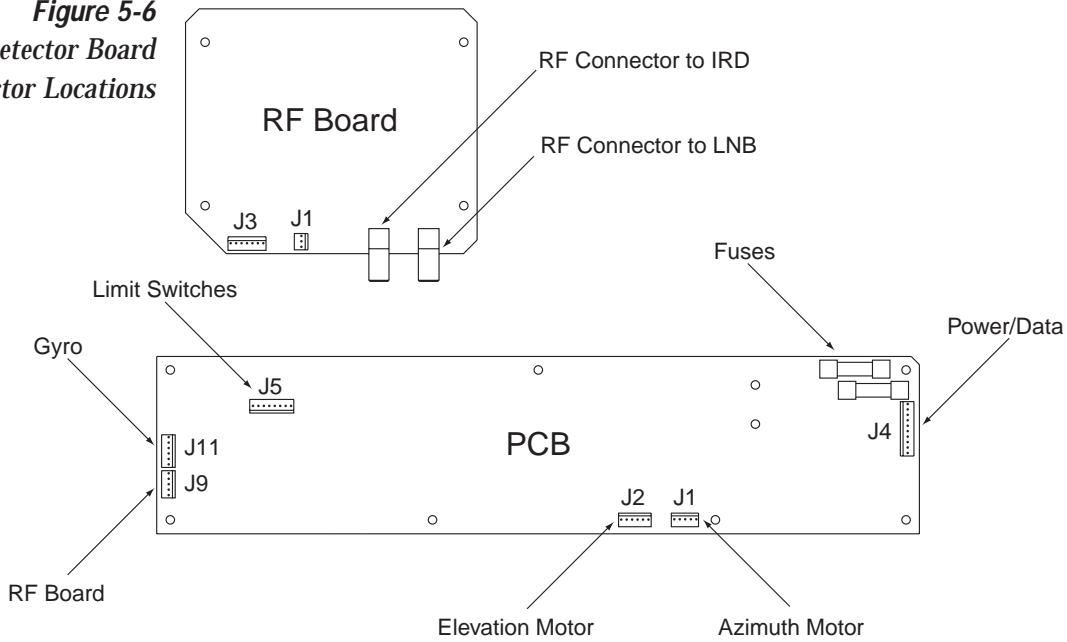
*When carrying out maintenance on the PCB, be sure to not drop any of the small screws inside the mechanism. If a screw is lost within the baseplate, it **must** be retrieved to avoid causing any damage when the unit rotates.*

Figure 5-5
Removing the PCB Cover



TracVision C3 is equipped with two 5x20 mm, 3.15-amp, 250-volt fast-blow fuses, which are mounted on the PCB. To access and replace one of these fuses, remove the PCB cover.

Figure 5-6
PCB and RF Detector Board
Connector Locations



When replacing the PCB cover, be careful not to pinch any cables.

7. The PCB is mounted to the rotating plate with 9 pan head screws. Remove the screws and PCB.
8. Reverse this process to install the replacement PCB. Reinstall all cable connectors removed in [Step 6](#).
9. Carry out all calibration procedures for the antenna gyro ([Section 5.4.3](#)).
10. Reinstall your preferred satellites as detailed in [Section 2.5.1, "Installing Your Selected Satellites."](#)

5.4.2 RF Detector/DVB Decoder

Estimated Time to Repair: ½ hour

The RF Detector PCB receives operating voltages from both the CPU board and the IRD (via the RF cable). Ensure that all power is turned off before proceeding.

1. Remove the 4 RF board cover screws and washers from the RF board cover.
2. Remove the RF board cover.
3. Remove the 2 RF connectors from the coaxial fittings on the PCB. Tag the cables to ensure that they are returned to the same connectors.
4. Remove the 2 Molex connectors from the RF board (J3 and J1) – [Fig. 5-6](#).

5. Remove the 4 standoffs – *Fig. 5-1*. Remove the RF Detector PCB from the rotating plate.
6. Installation of the replacement RF Detector is the reverse of this procedure. Be sure that the RF cables are restored to their original positions. Be sure that the center conductor pin is centered in the connector before tightening the collar.

5.4.3 Antenna Gyro Assembly

Estimated Time to Repair: 1 hour

The antenna gyro is mounted on the rear of the antenna reflector bracket with four locking nuts and washers – *Fig. 5-3*. Following the removal and replacement of the antenna gyro assembly, it will be necessary to calibrate the gyro and restart the system. Directions for removal, replacement, and calibration follow:

1. Using needle-nose pliers, remove the E-ring from one end of the connecting rod – *Fig. 5-2*.
2. Remove the connecting rod by sliding it off the bracket.
3. Fully retract the elevation axis motor shaft – *Fig. 5-5*.
4. Remove the 6 pan head screws from the PCB cover flanges.
5. Remove the PCB cover. To get the necessary clearance, rotate the linear actuator up 90° while lifting the PCB cover – *Fig. 5-5*.
6. Remove the screw and clamp holding the antenna gyro cable to the rotating plate. Be sure to save the cable clamp and screw – *Fig. 5-4*.
7. Remove the Molex connector from J11 on the PCB – *Fig. 5-6*.
8. Remove the 4 nuts and washers and take the gyro off of the bracket.
9. Remove the antenna gyro gasket.
10. Replacement is the reverse of this procedure.



Following the removal and replacement of the antenna gyro assembly, it will be necessary to calibrate the gyro and restart the system as described in the next section.

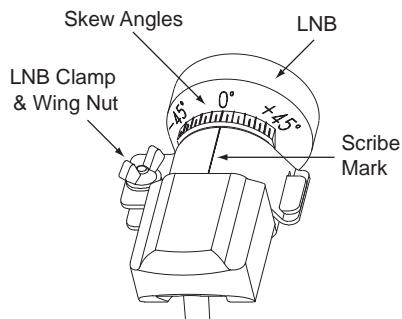
Antenna Gyro Calibration

1. Connect a PC to the communications port as described in [Section 4.4, “Computer Diagnostics.”](#)
2. Type **HALT<cr>** (*<cr> indicates a carriage return/ENTER key*) while the system is performing the limit switch initialization routine. The system will complete the initialization function by finding the azimuth and elevation switch limits and then go to the home position.
3. Type **DEBUGON<cr>** to enter Debug Mode.
4. Type **=CALGYRO<cr>**. Verify that the Antenna Gyro Azimuth scale factor is between -0.00090 and -0.00110 and the Antenna Gyro Elevation scale factor is between 0.00090 and 0.00110.
5. Type **ZAP** to restart/reinitialize the system.



The LNB receives power from the IRD via the RF Detector PCB. Be certain that the IRD is disconnected from its power source before removing or reconnecting the LNB.

Figure 5-7
LNB Skew Angle Setting
(European systems only)



5.4.4 Antenna LNB Replacement

Estimated Time to Repair: ½ hour

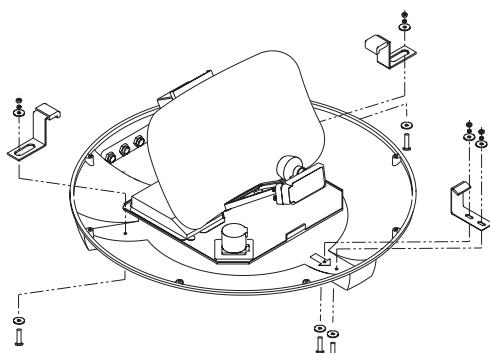
In the event that the LNB experiences problems, it may be necessary to replace it. To do so, use the following procedure:

1. *(European systems only)* Make a note of the current LNB skew angle, pictured in Figure 5-7.
2. Disconnect the RF cable connector(s) at the LNB.
3. Remove the wing nut and washer from the LNB clamp – [Fig. 5-3](#).
4. Remove the top of the LNB clamp and remove the LNB.
5. Place the new LNB in the clamp and reattach the RF connector(s).
6. Replace the LNB clamp:
 - A. For North American LNBs, tighten the clamp fully. The replacement process is complete.
 - B. For European LNBs, do not fully tighten the clamp and proceed to Step 7.
7. *(European systems only)* Carefully turn the LNB so that the scribe mark is aligned with the skew angle noted in Step 1. Fully tighten the clamp to complete the replacement process.

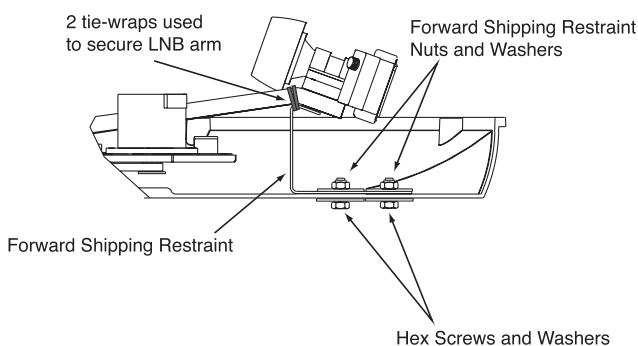
5.5 Preparation for Shipment

If it is necessary to repack the antenna unit for shipment, the shipping restraints removed during installation must be replaced. Follow these steps to reinstall the restraints.

1. Rotate the antenna unit so that the LNB is facing away from the baseplate connectors.
2. Attach the three restraints to the baseplate using the $\frac{1}{4}$ "-20 x $\frac{5}{8}$ " hex screws and washers (provided as part of the kitpack) and nuts (removed from the shipping restraints during installation) as pictured in Figure 5-8.



3. Place the antenna bracket on the forward shipping restraint.
4. Secure the forward restraint and bracket by wrapping two tie-wraps around the bend in the forward restraint and the antenna bracket (at the end of the LNB bracket).



5. Place the entire antenna unit into its shipping box using the original packaging material.



When rotating the azimuth mechanism by hand, go slowly! Hitting the mechanical stops with excessive force will damage the azimuth limit switch.

Figure 5-8
Attaching the Shipping Restraints to the Antenna Baseplate

Figure 5-9
Securing the Forward Shipping Restraint



KVH is not liable for damage caused by improper shipping.

Appendix A

System Specifications

Physical Characteristics

Power	11-16 volts DC @ 2.5 amps nominal, 3.5 amps peak
Dimensions/Weight	32" (81 cm) wide x 14.8" (38 cm) high, 33 lbs (15 kg)
LNB	European System: Single output N. American System: Dual output
Tracking	Better than 30°/sec
Maintenance Port	9600 bps, 8,N,1,EIA, RS232

Table A-1

*TracVision C3 System
Specifications*

Pointing System

Elevation Range	15° to 75°
Azimuth Range	720°
Position Repeatability	0.1°

Environmental

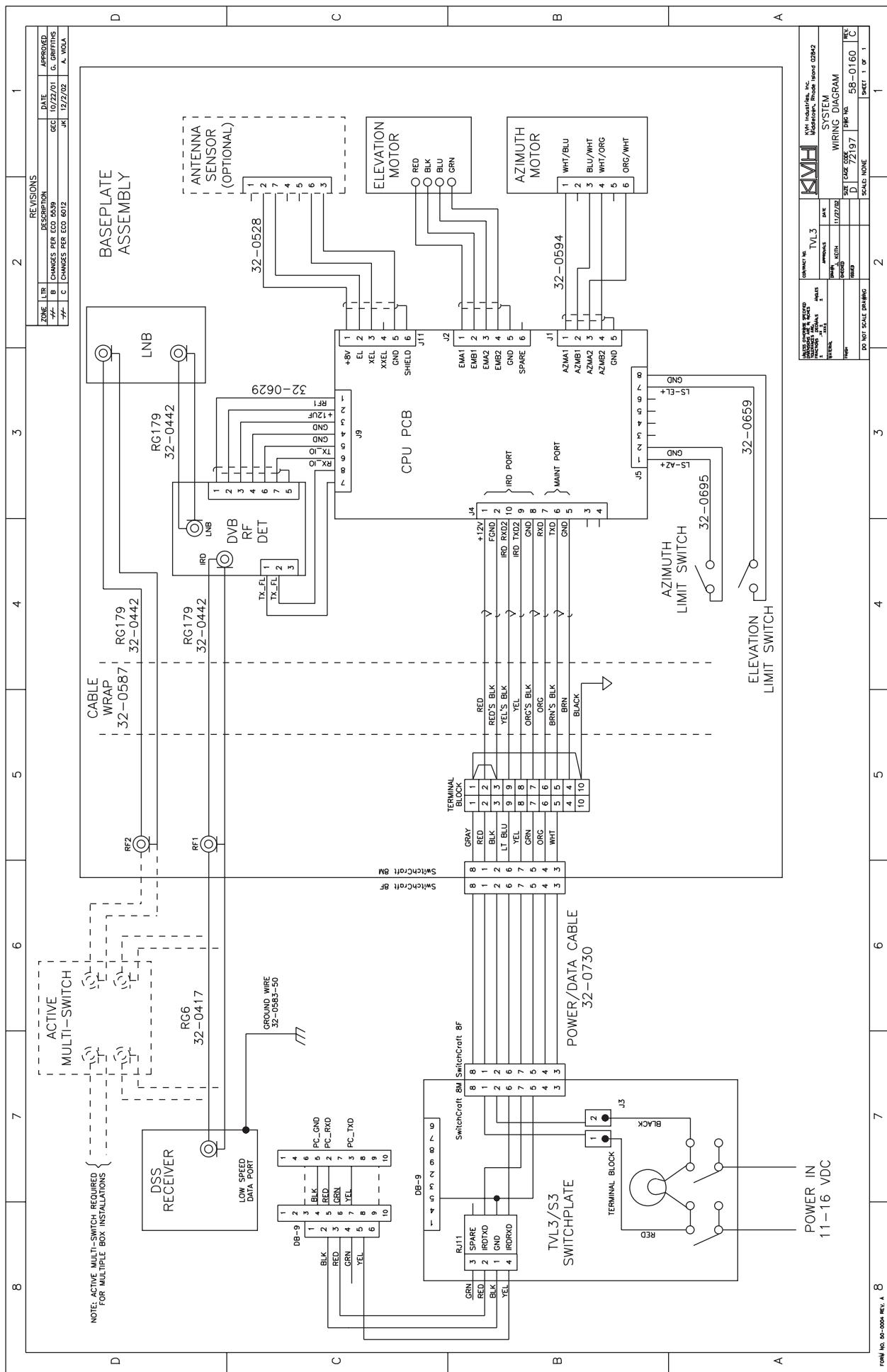
Operating Temperature	-25°C to +55°C (-13°F to +131°F)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Humidity	to 100 percent

Appendix B

Comprehensive TracVision C3

System Wiring Diagram

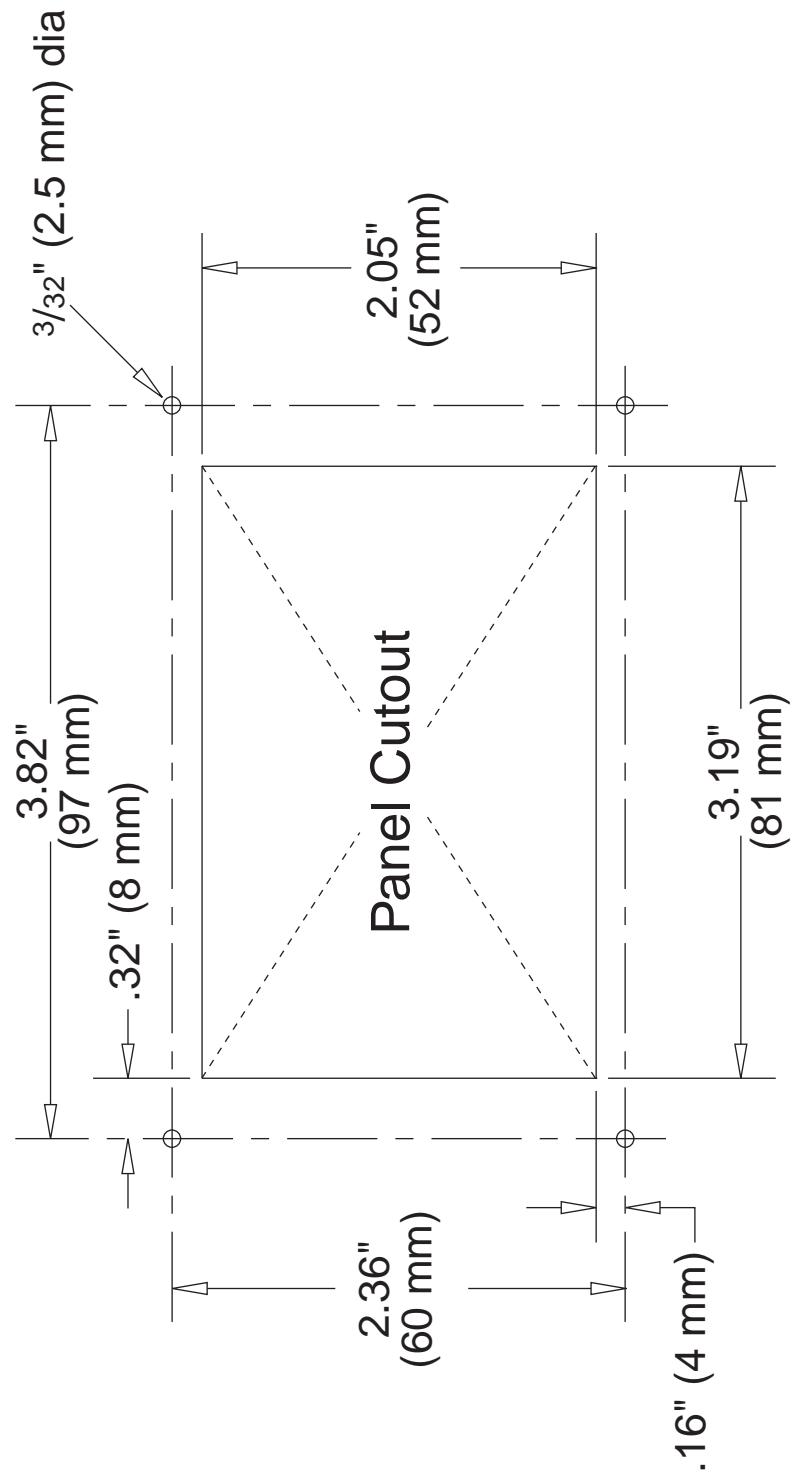
The wiring diagram is presented on the following page.





Appendix C

Switchplate Template



Appendix D

Startup Data Sequence

The data on the following pages presents a standard startup data sequence registered by the TracVision C3. This sequence can be recorded using the data port and a PC.

```
?PGM
KVH TracVision C3 Rev X - Version X.XX - Serial Number XXXXXXXX
RF: ZAP
*** Initializing RF Controller ***
RF: S,A,V,U,V
RF: SATINSTALL,55,C,57,C
RF: L,A-----Identifies Satellite A or B as currently
RF: SATCONFIG                               loaded for acquisition
RF: F,A,12368,20000,67,0X0000,V,U,2-----Satellite Configuration data, Satellite A
RF: F,A,12368,20000,67,0X0000,V,U,2
RF: F,A,12238,20000,67,0X0000,H,U,2
RF: F,A,12238,20000,67,0X0000,H,U,2
RF: F,B,12374,20000,34,0X1004,V,U,3-----Satellite Configuration data, Satellite B
RF: F,B,12374,20000,34,0X1004,V,U,3
RF: F,B,12381,20000,34,0X1004,H,U,3
RF: F,B,12381,20000,34,0X1004,H,U,3
RF: RF PCB Version X.X-----Current RF software revision
RF: I,0,49568,00000,00196,0
RF COMM: PASS-----PASS is expected
*** Initializing Antenna ***
GPS: UTC: 083000.00, Lat: 4131.00N, Long: 7115.00W
GPS: DSS_119 AZ = 238.9, EL = 22.1
GPS: DSS_101 AZ = 220.9, EL = 33.4
Limit Switch Test
Limit Switch Status: PASS-----PASS is expected
*** Initializing Rate Bias ***
+A/D: 1994 2029 329
RF: S,A,V,U,V
+A/D: 1994 2029 418
RF: S,A,H,U,V
+A/D: 1995 2028 267
RF: S,A,V,U,V
+A/D: 1995 2029 401
RF: S,A,H,U,V
+A/D: 1993 2029 290
RF: S,A,V,U,V
+A/D: 1994 2030 432
Gyro Bias: Az = 1994.01, El = 2029.16-----Expected range is 1700-2300
Gyro Uncertainty: Az =      3.00, El =      3.00
```

```
*** Limit Switch Search ***
RATE BIAS: PASS-----PASS is expected
Searching for DSS_101, Threshold = 1000
RF: S,A,H,U,V
+POS: 220.2 33.4 356
+POS: 155.5 33.4 333
RF: S,A,V,U,V
+POS: 85.0 33.4 429
RF: S,A,H,U,V
+POS: 14.4 33.4 274
*** Cable Unwrap ***
Cable Unwrap: AZ = -360.00
+POS: 9.8 33.4 466
RF: S,A,V,U,V
+POS: 180.1 33.4 630
Saved Sat Pos: EL = 33.4
*** Entering Search Mode 1 ***
Searching for DSS_101, Threshold = 1000
RF: S,A,H,U,V
Satellite Found: AZ = 303.4, EL = 33.4, RF = 1971
*** Entering Tracking ***
+POS: 306.7 33.4 1517
RF: S,A,V,U,V
+POS: 312.4 33.7 789
RF: S,A,H,U,V
+POS: 304.1 34.1 2184
RF: Freeze DAC = +01123
RF: S,A,V,U,V
+POS: 303.6 34.2 2482
+POS: 303.6 34.4 2509
*** Network ID Check ***-----Comparing the tracked satellite's network ID
+POS: 304.5 34.3 2437                               to the selected satellite's network ID
+POS: 303.5 34.7 2524
RF: Y,0X0000-----Indicates positive satellite identification
*** Tracking DSS_101 ***-----Identifies satellite currently tracked
+POS: 304.3 34.3 2534                               (TV broadcast image should be available)
Saved Sat Pos: AZ = 303.73, EL = 34.68
RF: AGCON
RF: AGC=51592
Gyro Bias Residue: Az = 1.2777e-01 EL = -1.0105e+00
+POS: 303.9 35.0 2482
Conscan=>sleep: sat in 1 deg window.
RF: AGC=51596
+POS: 304.0 34.4 2529
Saved Sat Pos: AZ = 303.96, EL = 34.44
RF: AGC=51611
Sleeping
```

Appendix E

Maintenance Port

Parser Commands

TracVision C3 system parser commands are parsed when the system receives an ASCII carriage return (Hex 0D). An ASCII line feed (Hex 0A) is permitted but is ignored in any transmitted command. All system responses are terminated with an ASCII carriage return followed by a line feed and ending with either an acknowledge character (ASCII > (Hex 3E)) or a not-acknowledge character (ASCII ? (Hex 3F)). The parser commands are shown below in boldface capital letters but they are not case-sensitive. In most cases the command is responded to with an echo; that is, if you type **ZAP**, for example, and press “ENTER” the response will be the command you have entered. For other commands the response is specific for each command, such as **VERSION**, **STATUS** or **HELP**.

E.1 System Commands

Software Version

Function:	reports software version and system type
Command:	VERSION
Argument:	none
Response:	KVH TracVision C3 Version XX.XX

Table E-1
System Commands

System Status Report

Function:	reports general system status
Command:	STATUS
Argument:	none
Response:	system status string

Initialize the System

Function:	initializes the system (perform a soft reset)
Command:	ZAP
Argument:	none
Response:	echoes the command, then reinitializes the system

Calibrate Gyro

Function:	performs azimuth and elevation calibration
Command:	CALGYRO
Argument:	none
Response:	echoes command and calibrates gyro

Find Skew Angle for Currently Selected Satellite

Function:	calculates necessary LNB skew based on latitude, longitude, and selected satellite
Command:	SKEWANGLE*
Argument:	none
Response:	displays skew angle

* Before this command can function properly, you must perform the GPS Position command detailed in [Section E.6](#) to provide the system with the proper latitude and longitude.

Help on Parser Commands

Function:	lists parser commands
Command:	HELP
Argument:	none
Response:	prints a list of all parser commands

E.2 Manual Positioning Commands

To execute the following commands, first put the antenna unit in idle mode by typing **HALT** and pressing “ENTER.” Positioning commands may be entered after the antenna comes to rest.

Table E-2
Manual Positioning Commands

Azimuth Angle

Function:	commands a manual azimuth angle that the mechanism moves to
Command:	AZ,xxxx (range is 0000-3599)
Argument:	desired azimuth angle of the mechanism relative to external magnetic reference, or baseplate fwd, 000°-359.9°
Response:	echoes the command; mechanism moves at a fixed velocity

Elevation Angle

Function:	commands a manual elevation angle that the mechanism moves to
Command:	EL,xxx (range is 100-850)
Argument:	desired elevation angle of the mechanism relative to up, 10.0°-85.0°
Response:	echoes the command; mechanism moves at a fixed velocity

Azimuth CW Step

Function:	commands a 0.1 deg CW manual step in azimuth angle
Command:	6
Argument:	none
Response:	echoes the command

Azimuth CCW Step

Function:	commands a 0.1 deg CCW manual step in azimuth angle
Command:	4
Argument:	none
Response:	echoes the command

Elevation UP Step

Function:	commands a 0.1 deg UP manual step in elevation angle
Command:	8
Argument:	none
Response:	echoes the command

Elevation DOWN Step

Function:	commands a 0.1 deg DOWN manual step in elevation angle
Command:	2
Argument:	none
Response:	echoes the command

E.3 Operational Commands

To execute the following commands, first put the antenna unit in idle mode by typing **HALT** and pressing “ENTER.” After the system comes to a halt, type **DEBUGON** and press “ENTER” to enter programming mode.

Table E-3
Operational Commands

Tracking Mode	
Function:	starts active tracking of the satellite
Command:	TRACK
Argument:	none
Response:	echoes the command

Idle Mode	
Function:	halts active tracking and conical scan, then enters idle mode
Command:	HALT
Argument:	none
Response:	echoes the command

Current Cable Wrap Angle	
Function:	sets or reports current cable wrap angle, defined as 0° (CCW limit) to 700° (CW limit); the value is expressed as 0000-7000 with an implied decimal
Command:	WRAPANGLE,xxxx
Argument:	the desired cable wrap angle setting
Response:	Wrap Angle = xxxx

E.4 Tracking and Conical Scan Commands

Table E-4
Tracking and Conical Scan Commands

Target Location	
Function:	reports the target location in antenna frame. Data format is E### for elevation in degrees 000-900 and A#### for azimuth in degrees 0000-3599 with implied decimals
Command:	TGTLOCATION
Argument:	none
Response:	Target Location = A = E###, A#### B = E###, A####

Analog Signal Strength Report

Function:	reports signal strength from RF detector circuit in A/D counts (000-FFF Hex)
Command:	SIGLEVEL
Argument:	none
Response:	Signal Strength = xxxx

E.5 RF Board Commands

Serial Communications, Status/Polarization Report, Tone Changes

Function:	start serial communications, reports status & polarization/tone changes
Command:	@S
Response:	S,s,p,b,m <cr> every 5 seconds until ><cr>is returned from system software
Where:	s = Satellite (a = Primary, b = Secondary) p = Polarization (v = Vertical, h = Horizontal, r = Right, l = Left, x = No LNB Power) b = Band (h = High Band, l = Low band, u = USA) m = Mode (v = Valid, i = Invalid)*

Table E-5
RF Board Commands

* The Mode bit is used to evaluate the Satellite, Polarization, & Band combination vs. the Frequency/Symbol Rate/FEC currently in RAM. This bit will be set to invalid if the Frequency for the selected combination is set to 0x0000; otherwise it will be set to valid.

Report RF Tracking Parameters

Function:	reports all RF tracking parameters for primary & secondary satellites*
Command:	@SATCONFIG
Response:	F,x,fffff,S,C,ID,P,B,D <cr>
Where:	<p>x = Satellite (a = Primary, b = Secondary) fffff = Frequency in MHz (00000 and 10700 to 12700) S = Symbol rate in Mbit/Sec (1000 to 29999) C = FEC code rate (valid rates = 12, 23, 34, 56, 67, 78) ID = Satellite Network ID in hexadecimal format (valid range = 0x0000 to 0xffff hex) P = LNB Polarization (v = vertical, h = horizontal, r = right, l = left) B = the LNB down conversion frequency (l = low, h = high, u=USA) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)</p>

* This command dumps all eight combinations of the Satellite/Freq/Sym/FEC/ID/POL/Band/Decode currently stored in RAM.

Set RF Tracking Parameters

Function:	sets RF tracking parameter
Command:	@SATCONFIG,X,N,F,S,C,ID,P,B,D<cr>
Response:	Echoes the input data
Where:	<p>@SATCONFIG = directs data to the RF Board X = satellite location A or B N = satellite table # (98 & 99 are slots for user-configured satellites) F = frequency in MHz (either 00000 or a range from 10700 - 12700) S = the satellite transponder symbol rate in Mbit/second (01000 - 29999) C = the FEC code (e.g., 12, 23, 34, 56, 67, 78) ID = the satellite network ID in hexadecimal format (0x####) P = the LNB polarization (v = vertical, h = horizontal, r = right, l = left) B = the LNB down conversion frequency (l = low, h = high, u = US) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3=DVB)</p>

ID Match/Decoded Network ID

Function:	report ID match and decoded network ID
Command:	@CHECKID
Response:	Y,0X##### N,0X##### Y,Noid N,Noid
Where:	Y = yes N = no 0X##### = network ID Noid = satellite unidentified

E.6 Installation Commands

To execute the following commands, first put the antenna unit in idle mode by typing **HALT** and pressing “ENTER.” After the system comes to a halt, type **DEBUGON** and press “ENTER” to enter programming mode.

Select Active Satellite

Function:	switch antenna tracking to/from satellite A and B
Command:	@L,x
Where:	x = A or B (as defined during the SATINSTALL process)

Set/Report GPS Position

Function:	reports or sets default GPS position
Command:	GPS<cr> GPS,XX,D,YYY,E
Response:	GPS = XXD YYYY<cr> GPS: XXD YYYY
Where:	XX = latitude (0 - 90) D = S (South) or N (North) YYY = longitude (0 - 180) E = E (East) or W (West)

Table E-6
Installation Commands

Report Satellite Names

Function:	report names for satellites A and B
Command:	SATINSTALL
Response:	SATINSTALL,<sat_a_name>,<sat_b_name>

Report Configured Satellite Names

Function:	report names for all configured satellites
Command:	SATLISTA
Response:	SATLISTA,<sat_name1>,...,<sat_nameX>

Report Valid Satellite B Selections

Function:	report names for all valid satellite B selections for a given satellite A selection
Command:	SATLISTB,<sat_a_name>
Response:	SATLISTB,<sat_a_name>,<sat_b_name1>...,<sat_b_nameX>

Install Satellite Pair

Function:	installs satellites A and B as the satellite pair
Command:	SATINSTALL,<sat_a_name>,<sat_b_name>
Response:	If valid pair, echoes the input data If invalid pair, returns error message

Configure Longitude of a User-configurable Satellite

Function:	configures one of the user-configurable satellites with the longitude provided
Command:	SATCONFIG,USERX,YYY,Z,D,L
Response:	If valid pair, echoes the input data If invalid pair, returns error message
Where:	X = 1 or 2 YYY = longitude (0-180) Z = E (East) or W (West) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB) L = LNB polarization (c = circular, l = linear)

E.7 Debug Commands

Report Offset Angles

Function:	reports system offset angles
Command:	OFFSETS OFFSETS,XXXXX,YYYY
Response:	Offsets= XXXXX.X XXXXX.X
Where:	X = new azimuth offset (-1800 - 1800) Y = new elevation angle (-450 - 450)

Table E-7
Debug Commands

Applies Default Values to Default Satellites

Function:	updates the default satellites to the default values
Command:	SATPAIR,X
Response:	displays numerous frequency commands and reports "Satellite Installation Complete"
Where:	X = 0 (satellites default to Astra1 and Hotbird) or X = 1 (satellites default to EchoStar 119 and Expressvu) or X = 2 (satellites default to DSS 101 and DSS 119)

Report Last Satellite Tracked/Update Value

Function:	reports the last satellite tracked or updates the last tracked satellite to the value input if it is different from the current value
Command:	LASTSAT LASTSAT,X
Response:	Last = <sat_name>
Where:	X = A (updates to satellite A) or X = B (updates to satellite B)

KVH Industries Limited Warranty

TracVision C3

Limited Warranty on Hardware

KVH Industries, Inc. warrants the KVH product purchased against defects in materials for a period of TWO (2) years and against factory labor costs for a period of ONE (1) year from the date of original retail purchase by the original purchaser. It is the customer's responsibility to verify the date of purchase by returning the warranty card included with the product to KVH within 30 days of purchase, or by providing a copy of a dated sales receipt for the KVH product under warranty with the warranty claim. If this date cannot be verified, the warranty period will begin 30 days after the date of manufacture of the original product purchased.

If you discover a defect, KVH will, at its option, repair, replace or refund the purchase price of the product at no charge to you, provided you return it during the warranty period, transportation charges prepaid, to the factory direct. Please attach your name, address, telephone number, a description of the problem and a copy of the bill of sale or sales receipt as proof of date of original retail purchase, to each product returned to warranty service. Alternatively, you may bring the product to an Authorized KVH dealer/distributor for repair. During the first year, and if the product was installed by an Authorized KVH dealer/distributor (identified with the KVH Authorized dealer/distributor list), KVH will cover the dealer's/distributor's labor charges for warranty repairs, provided the dealer/distributor contacts KVH for pre-approval of the charges. Approval of charges is at KVH's sole discretion.

This Limited Warranty does not apply if the product has been damaged by accident, abuse, misuse or misapplication or has been modified without the written permission of KVH; if any KVH serial number has been removed or defaced; or if any factory-sealed part of the system has been opened without authorization.

Return Authorization

A Return Material Authorization is required prior to returning the product to KVH Industries. Please call our Technical Support Department at +1 401 847-3327 or send an e-mail to techs@kvh.com to obtain the RMA number. Write the number in large, clear characters on the outside of the box. To avoid confusion and misunderstandings, shipments without an RMA number clearly visible on the outside box will be refused and returned to you at your expense. If possible, use the original box and packing material to protect the equipment from damage in shipment. KVH assumes no responsibility for warranty shipments from the customer to the factory if not shipped in the manner prescribed above.

THE EXPRESS WARRANTIES SET FORTH ABOVE ARE THE ONLY WARRANTIES GIVEN BY KVH WITH RESPECT TO ANY PRODUCT FURNISHED HEREUNDER; KVH MAKES NO OTHER WARRANTIES, EXPRESS, IMPLIED OR ARISING BY CUSTOM OR TRADE USAGE, AND SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. SAID EXPRESS WARRANTIES SHALL NOT BE ENLARGED OR OTHERWISE AFFECTED BY TECHNICAL OR OTHER ADVICE OR SERVICE PROVIDED BY KVH IN CONNECTION WITH ANY PRODUCT.

KVH's liability in contract, tort or otherwise arising out of or in connection with any product shall not exceed the price paid for the product. IN NO EVENT SHALL KVH BE LIABLE FOR SPECIAL, PUNITIVE, INCIDENTAL, TORT OR CONSEQUENTIAL DAMAGES OR LOST PROFITS OR GOODWILL (INCLUDING ANY DAMAGES RESULTING FROM LOSS OF USE, DELAY IN DELIVERY OR OTHERWISE) ARISING OUT OF OR IN CONNECTION WITH THE PERFORMANCE OR USE OR POSSESSION OF ANY PRODUCT, OR ANY OTHER OBLIGATIONS RELATING TO THE PRODUCT, EVEN IF KVH HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

If any implied warranty, including implied warranties of merchantability and fitness for a particular purpose, cannot be excluded under applicable law, then such implied warranty shall be limited in duration to ONE (1) YEAR from the date of the original retail purchase of this product by the original purchaser.

Some states/countries do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state/country to state/country.



KVH Industries, Inc.

50 Enterprise Center Middletown, RI 02842 U.S.A.
Phone: +1 401 847-3327 Fax: +1 401 849-0045
E-mail: info@kvh.com Internet: www.kvh.com

KVH Europe A/S

Ved Klaedebo 12 2970 Hoersholm Denmark
Phone: +45 45 160 180 Fax: +45 45 867 077
E-mail: info@kvh.dk Internet: www.kvh.com